

# **EXHIBIT N**



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Board of Patent Appeals and Interferences  
Patent and Trademark Office (P.T.O.)

\*1 Watson & Chalin Manufacturing, Inc. (United States Patent 6,508,393), Patent  
Owner-Appellant,  
v.  
Hendrickson USA, L.L.C., Third-Party Requester-Respondent.

APPEAL 2007-2782  
Inter Partes Reexamination Control 95/000,030 Technology Center 3900

DECIDED: February 6, 2008

For Patent Owner  
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Before JOHN C. MARTIN, LEE E. BARRETT, and MARK NAGUMO  
Administrative Patent Judges  
BARRETT  
Administrative Patent Judge

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. §§ 134(b) and 315(a) by the Patent Owner after a Right of Appeal Notice finally rejecting claims 1-6 and 8-48. Claim 7 has been canceled.

We affirm-in-part and enter new grounds of rejection.

INTER PARTES REEXAMINATION

A request was filed on December 3, 2003, by Third-Party Requester The Boler Company ("Requester"), for *inter partes* reexamination of U.S. Patent 6,508,393 (the '393 patent) issued January 21, 2003, to inventor Thomas N. Chalin, based on Ap-

plication 09/814,535, filed March 22, 2001, entitled "Suspension System Including Arm Having Zero Clearance Axle Connection," and assigned to real party in interest Watson & Chalin Manufacturing, Inc. ("Patent Owner"). The rights of the original Requester real party in interest, The Boler Company, have been assumed by the new real party in interest, Hendrickson USA, L.L.C.

#### BACKGROUND

The invention relates to an axle/suspension system for trucks and tractor-trailers. Figure 1 of the '393 patent is reproduced below:

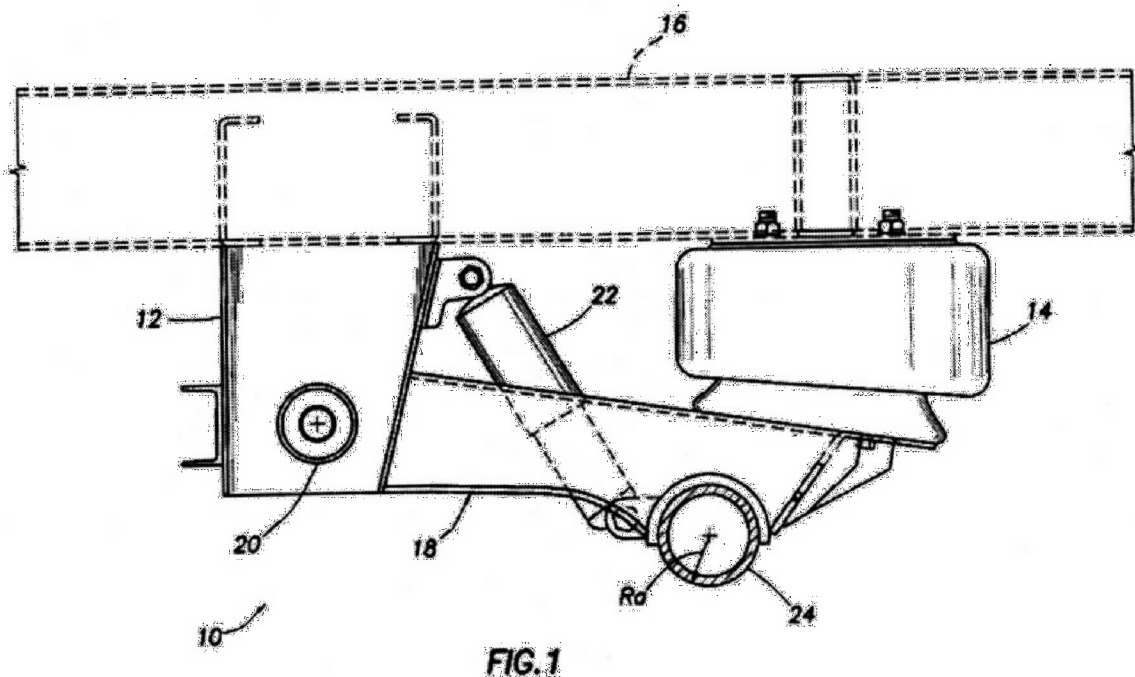


Figure 1 shows an axle/suspension system 10. The suspension system 10 includes a hanger bracket 12, an air spring 14 for supporting a vehicle frame 16 above the suspension system, a pivot arm assembly 18 pivotally attached to the hanger 12 by bushing 20, a shock absorber 22 to dampen movement of the pivot arm assembly 18, and an axle 24 ('393 patent, col. 2, ll. 30-44). In particular, the invention relates to a method for mounting the axle 24 to the pivot arm assembly 18. The structure for connecting the axle 18 to the pivot arm is called an "axle connector."

The '393 patent explains that in one prior art suspension system, an axle connector is made up of multiple pieces, the multiple pieces are then assembled and clamped to the axle using a separate clamp, and the multiple pieces are welded to the axle. This has the disadvantages of requiring multiple axle connector pieces

and requiring a clamp to clamp the axle to the axle connector before welding. See col. 1, ll. 18-27.

\*2 The '393 patent also explains that in another prior art suspension system, the axle connector is pressed onto an end of the axle. This has the disadvantages of requiring a special press in order to accommodate the length of an axle and requiring machining to precise tolerances to achieve an interference fit between the parts. See col. 1, ll. 28-33.

Figure 3 of the '393 patent is reproduced below.

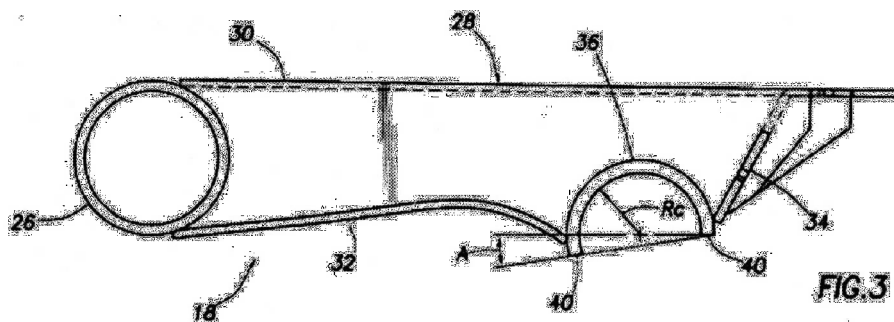


Figure 3 depicts the pivot arm assembly 18 having a bushing tube 26, a pivot arm 28, a rear support plate 34, and an axle connector 36 for attaching to the axle (col. 2, ll. 47-49).

The solution to the prior art problems described in the '393 patent is a single-member axle connector 36 configured so that it extends more than halfway around the axle 24, without completely encircling the axle (col. 2, ll. 54-65). The axle connector 36 has an inner radius  $R_c$  which is less than an outer radius  $R_a$  of the axle 24 (col. 3, ll. 3-5). The axle is laterally inserted into the axle connector, which spreads apart the ends 40 of the axle connector and elastically deforms the axle connector. Once the ends are past the diameter of the axle, the axle connector springs back and grips onto the outer diameter of the axle (col. 2, l. 66 to col. 3, l. 9). The benefits of this attachment method are said to be: the single-piece axle connector eliminates extra pieces, thereby reducing the number of pieces that must be inventoried and assembled; the spring force caused by deformation of the axle connector clamps the axle connector to the axle, which eliminates the need for separate clamps during welding; no special press is required because the axle is inserted laterally instead of from the end; and close tolerance machining for the axle connector radius  $R_c$  and the axle 24 radius  $R_a$  is not required because the elastic grip of the axle connector will compensate for a relatively wide range of the radii  $R_c$  and  $R_a$  and eliminate clearance between the axle connector and the axle (col. 3, ll. 10-24).

The '393 patent describes three ways to order the steps of assembling the axle to

the axle connector: (1) attaching the axle connector to the axle, welding the axle connector to the axle, and then welding the axle connector to the pivot arm; (2) attaching the axle connector to the axle, welding the axle connector to the pivot arm assembly, and then welding the axle connector to the axle; and (3) welding the axle connector to the pivot arm assembly, and then attaching the axle connector to the axle (and, implicitly, then welding the axle connector to the axle). See col. 3, ll. 34-41.

Not all of the described features appear in every claim.

Claim 1 is reproduced below (the addition to the original patent claim 1 is underlined, see 37 C.F.R. §§ 1.941 and 1.530(f)).

\*3 1. A method of manufacturing a vehicle suspension system, the method comprising the steps of:  
welding an axle connector to an axle, without first pressing the axle connector onto the axle from an end of the axle, and without using a clamp to hold the axle connector in contact with the axle; and  
then welding the axle connector to a pivot arm.

#### REFERENCES

Pierce (Pierce PCT)	WO 00/01548	Jan. 13, 2000
Pierce (Pierce US)	US 6,508,482 B2	Jan. 21, 2003
		(filed Dec. 15, 2000)

The Examiner also refers to the following evidence submitted by the Requester:

Affidavit of Phil Pierce dated May 19, 2004 (Pierce Affidavit).

Hendrickson drawings, Figures 1 and 2.

Stress Engineering Services, Inc., *Final Report For Press Fit Analysis of Suspension Beam*, November 24, 1998 (Stress Report), pp. 1 and 4-6.

#### REJECTIONS

Claims 1-6, 8-17, 19-26, 28-41, and 43-48 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Pierce PCT.

Claims 1-6, 8-17, 19-26, 28-41, and 43-48 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Pierce US.

Claims 18, 27, and 42 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Pierce PCT.

Claims 18, 27, and 42 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Pierce US.

#### DISCUSSION

##### *Pierce references*

Pierce US includes essentially the same disclosure as Pierce PCT, but includes additional disclosure related to a third embodiment in new Figures 15-22. For simplicity, we cite mainly just to Pierce PCT because it is a statutory bar reference

under 35 U.S.C. § 102(b). All rejections affirmed over Pierce PCT will also be affirmed over Pierce US because of the common disclosure. However, some rejections based on Pierce PCT are reversed but are affirmed based on Pierce US due to the added disclosure of the third embodiment. The references are referred to as “Pierce” unless it is necessary to distinguish Pierce PCT from Pierce US.

#### ***Arguments not raised are waived***

Arguments not raised are deemed to have been waived. See 37 C.F.R. § 41.67(c)(1)(vii) (“Any arguments or authorities not included in the brief ... will be refused consideration by the Board, unless good cause is shown.”); *In re Watts*, 354 F.3d 1362, 1367 (Fed. Cir. 2004) (“Just as it is important that the PTO in general be barred from raising new arguments on appeal to justify or support a decision of the Board, it is important that the applicant challenging a decision not be permitted to raise arguments on appeal that were not presented to the Board.” (Footnote omitted.)). Where claims are argued as a group by Patent Owner, only a single claim in the group needs to be addressed. See 37 C.F.R. § 41.67(c)(1)(vii) (“Notwithstanding any other provision of this paragraph, the failure of appellant to separately argue claims which appellant has grouped together shall constitute a waiver of any argument that the Board must consider the patentability of any grouped claim separately.”).

#### ***Claim interpretation***

\*4 Proper claim interpretation necessarily precedes a determination of patentability. See *Gechter v. Davidson*, 116 F.3d 1454, 1457 (Fed. Cir. 1997) (“Implicit in our review of the Board's anticipation analysis is that the claim must first have been correctly construed to define the scope and meaning of each contested limitation.”).

Although neither Patent Owner nor the Examiner argue about claim interpretation, the meanings of the terms “elastically deforming” and “permitting the axle connector to spring back” are important in deciding the anticipation rejection.

#### ***Elastic deformation***

One dictionary definition of “deform” is “to change the shape of (a body) by the action of forces.” *Webster's Third New International Dictionary (Unabridged)* 593 (G.&C. Merriam Co. 1971). This is consistent with the meaning in the engineering art, as defined in the undergraduate textbook by Edward F. Byars and Robert D. Snyder, *Engineering Mechanics of Deformable Bodies* 3 (Int'l Textbook Co. 1967):

The primary reason for the existence of an engineering material, member, or structure is to resist loads. Occasionally, other factors such as appearance are important. As far as this study of deformable bodies is concerned, however, the main function of an engineering member is to resist loads. Engineering mechanics of deformable bodies deals with the relationships between the loads applied to the bodies and the resulting internal effects and dimension changes of the body. ... Generally, the internal-force intensities are known as stresses and the dimension changes are called deformations.

*Engineering Mechanics* 25 further states:

As stated earlier, mechanics of deformable bodies concerns the relationships between external loads and the resulting internal force intensities and dimension changes. Chapter 1 dealt with the internal force intensities, which were defined as stresses. This chapter will be a similar treatment of dimension changes.

The primary function of an engineering member is to resist loads. When loads of any type are applied to a member, the member will always undergo dimension changes. In other words, the loads alter the size and/or the shape of the body. Such dimension changes may or may not be visible to the naked eye depending on the degree to which the loads alter the body.

A dimension change is called a deformation and will be denoted by the letter *e*.

One definition of “elastic,” as applied to solids, is “capable of recovering size and shape after deformation.” *Webster’s* at 730. “Elastic deformation” is contrasted with “plastic deformation” in *Engineering Mechanics* 60-62:

**Elastic action.** *Elastic* is an adjective meaning “capable of recovering size and shape after deformation.” If a material is subjected to load, deformation will result. If, upon release of the load, the material returns to its original size and shape, it has undergone *elastic* action or *elastic* deformation. The stress was an *elastic* stress within the elastic range. *Elastic limit* is the maximum *uniaxial* stress that can be applied to a material without causing any permanent deformation.

\*5 ...

**Plastic action.** *Plastic* deformation, or *permanent set*, is any deformation that remains in the material *after* the load has been removed. All deformation is composed of plastic and elastic deformation. However, when the plastic deformation is negligible compared to the elastic deformation, the material is said to be elastic, and vice versa.

Therefore, we understand “elastic deformation” to mean “capable of recovering size and shape after a dimension change due to a force or load.”

The elastic deformation of the axle connector is critical to the inventions described in the '393 patent. According to the '393 patent, “[t]he axle connector is uniquely configured and is an important aspect of the method of manufacturing the suspension system 10” (col. 2, ll. 55-57). The '393 patent discloses that “the axle connector 36 is configured so that it extends more than halfway about the axle 24, without completely encircling the axle” (col. 2, ll. 59-61; Figure 3). The '393 patent further discloses:

In the method of manufacturing the suspension system 10, the axle connector 36 is attached to the axle 24 by elastically deforming the axle connector, so that it fits over the outer diameter of the axle. The axle connector 36 then springs back and grips onto the outer diameter of the axle. Thus, when the axle connector 36 is formed, it has an inner radius  $R_c$  which is less than an outer radius  $R_a$  of the axle 24. The axle connector 36 is elastically spread, so that its ends 40 fit over the outer diameter of the axle 24 (which also causes its radius  $R_c$  to become greater than the axle radius  $R_a$ ), and then the axle connector is allowed to spring back onto the outer diameter of the axle.

(Col. 2, l. 66 to col. 3, l. 9.) Therefore, elastic deformation in the axle connector described by the '393 patent is produced by two different geometrical relationships:

(1) The axle connector has an inner radius  $R_c$  which is less than the outer radius  $R_a$  of the axle, so that when the axle is inserted into the smaller recess the axle connector must be expanded (deformed) to fit around the axle. The axle connector holds the axle in “an elastic grip” (col. 3, l. 17), i.e., “without using a clamp to hold the axle connector in contact with the axle” (claim 1), because the axle connector tries to return to its original shape due to being elastically deformed.

(2) The axle connector wraps more than halfway around the axle, causing the ends 40 to be “elastically spread” (col. 3, l. 6) apart (deformed) while the axle is being forced between the ends. The axle connector “spring[s] back” (col. 3, l. 9) after the ends pass over the center of the axle because the axle connector was being elastically deformed (as opposed to plastically deformed, where there would be no tendency to return to its original shape). Of course, it is necessary for the axle connector to have an inner radius less than the outer radius of the axle, as described in (1), in order for the axle connector to grip the axle once it inserted; if the axle had a smaller diameter than the axle connector it would fit loosely.

#### **Permitting the axle connector to “spring back”**

\*6 Dependent claim 16 recites “the steps of elastically deforming the axle connector over the axle, and then permitting the axle connector to spring back, thereby holding the axle connector in contact with the axle.” Dependent claim 22 recites “permitting the axle connector to spring back after the enlarging step.” An issue regarding claim 16 is whether “permitting the axle connector to spring back” requires actual movement or just the capability of movement due to elastic



deformation of the axle connector.

Some definitions of the verb “spring” are “(1): to undergo a sudden or violent change in place or position ... (2): to have or display resiliency : move or be capable of moving by elastic force <the two halves *sprang* back together again - C.L. Carmer>.” *Webster’s* 2209. One definition of “back” is “to or toward a former condition : to or toward a former or original state (as of activity, consciousness, or productivity.” *Id.* at 157.

As explained above, in the '393 patent the axle connector extends more than halfway about the axle surface (col. 2, ll. 56-60), and the ends of the axle connector are elastically spread apart during insertion of the axle, so the ends of the axle connector will “spring back,” i.e., actually move back towards one another, once the ends are forced past the center of the axle (col. 2, l. 66 to col. 3, l. 9). The '393 patent also explains that if the axle connector has a smaller diameter recess than the axle, and the axle connector is elastically deformed by the axle, the axle connector will “spring back” onto the axle (col. 3, ll. 3-9). However, this description is based on the preceding paragraph where the axle connector is described as extending more than halfway around the axle (col. 2, ll. 58-60). If the axle connector did not extend more than halfway around the outside surface of the axle, the axle connector would be elastically deformed by the axle due to its larger diameter and thus would exert compressive force on the axle after it is deformed, but it would not move back towards its original position as it is prevented from doing so by the axle.

We interpret “permitting the axle connector to spring back,” consistent with the Specification, to require actual movement in a direction back towards (although it need not reach) an original position, not just a tendency to move towards the original position. This interpretation is also consistent with the fact that “permitting the axle connector to spring back” in the claims is recited as a separate method step which occurs after the step of elastically deforming the axle connector. Our interpretation of “permitting the axle connector to spring back” implies axle connector structure which moves after the step of elastically deforming, such as an axle connector extending more than 180° about the axle outer surface as in claim 6, 12, and 39, where the ends are free to move back towards their original position after the axle is inserted (these claims do not need to recite the step of “permitting the axle connector to spring back,” because springing back is inherent in the recited structure).

### ***Principles of law***

\*7 Absent claim language requiring the steps of a method claim to be performed in a specific order, it is improper to require the steps to be performed in the order listed. *Interactive Gift Express, Inc. v. Compuserve Inc.*, 256 F.3d 1323, 1342-43 (Fed. Cir. 2001).

All the disclosures in a reference must be evaluated, including nonpreferred embodiments. See *In re Inland Steel Co.*, 265 F.3d 1354, 1361 (Fed. Cir. 1354).

“Anticipation is established only when a single prior art reference discloses, expressly or under principles of inherency, each and every element of a claimed invention.” *RCA Corp. v. Applied Digital Data Sys., Inc.*, 730 F.2d 1440, 1444 (Fed. Cir. 1984).

“Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set circumstance is not sufficient.” *In re Oelrich*, 666 F.2d 578, 581 (quoting *Hansgirk v. Kemmer*, 102 F.2d 212, 214 (CCPA 1939)).

Extrinsic evidence may be considered to demonstrate that missing descriptive matter is necessarily present (inherent). See *Scripps Clinic & Research Foundation v. Genentech, Inc.*, 927 F.2d 1565, 1576 (Fed. Cir. 1991) (“The role of extrinsic evidence is to educate the decision-maker to what the reference meant to persons of ordinary skill in the field of



the invention, not to fill gaps in the reference.”).

### *Pierce*

The Pierce references are “directed to a trailing arm rigid beam-type axle/suspension system for trucks and tractor-trailers in which the axle is securely and efficiently mounted directly to the beams without any additional mounting hardware such as bolts, brackets and the like” (p. 1, ll. 10-14<sup>[FN1]</sup>).

Pierce explains in the Background of the Invention that [U.S. Patent 5,375,871 \(Mitchell\)](#) describes a prior art axle/suspension system wherein “[t]he upper portion of the axle is seated in a discrete shell member having a curved configuration which is complementary to the curvature of the axle” (p. 3, ll. 21-33). Figure 1 of Mitchell is reproduced below:

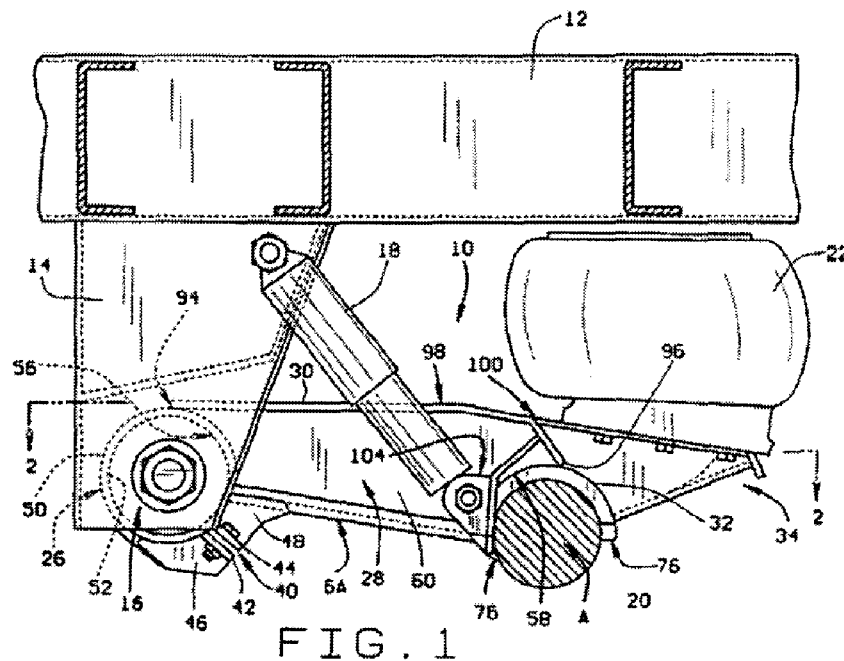


Figure 1 depicts an axle suspension system wherein an axle (shown as a shaded circle) is attached to a semicylindrical shell 32.

According to Pierce, the problem with the mounting arrangement in Mitchell is that the loose seating of the axle in the shell 32 causes increased stresses:

The relatively loose seating of the axle in the shell, whereby areas of clearance exist between the outer surface of the upper portion of the axle and the lower surface of the shell, intensifies the stress placed on the welds by the various loads. More particularly, especially during conditions of trailer lean which causes the aforementioned torsional loads, the horizontal welds are subjected to a cycling range of tensile and compressive loads, and areas of clearance between the axle and beam mount widen this cycling range thus placing increased stress on the welds.

\*8 (P. 4, ll. 6-14.)

Pierce solves these problems in a preferred embodiment by creating a tight fit between the axle and the axle mounting plate:

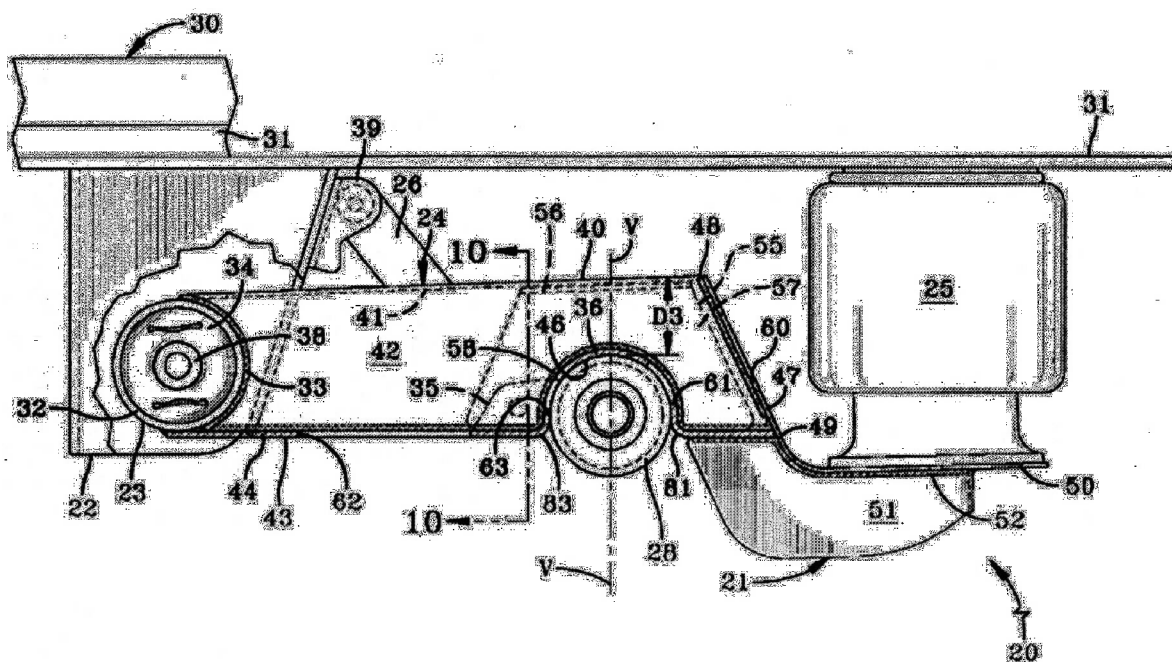
These problems have been solved by the present invention through the use of a pre-assembled rigid or spring beam hav-

ing an axle mounting plate formed with a recess which is slightly smaller than or the same size as the smallest axle which will be seated therein, and by seating the axle in the recess under force sufficient to deform a round axle into a generally oval or elliptical shape at the area of axle mounting to the beam. Such a tight fit eliminates clearance and creates intimate contact between the axle and the axle mounting plate of the beam so that a preload or compression occurs at the interface between the outer surface of the axle and the axle contacting surface of the axle mounting plate. This intimate contact strengthens the axle against loads and resulting stresses encountered during operation of the vehicle and eliminates the need for an unusually robust beam and significant accessory hardware for supporting the axle.

(P. 4, l. 30 to p. 5, l. 12.)

Pierce discloses that “beam 24 preferably is preassembled prior to mounting axle 28 thereon” (p. 12, ll. 3-4).

Figure 1 of Pierce is reproduced below.



**FIG-1**

Figure 1 depicts one suspension assembly 21 of an axle/suspension system 20. A hanger 22 is mounted to longitudinally extending rails 31 that are attached to vehicle frame 30. A trailing arm rigid beam 24 is pivotally attached to the hanger 22 by bushing assembly 23. An axle 28 is welded to a recess 46 in an axle mounting plate of the beam 24. An air spring extends between the rear end of the beam 24 and frame rail 31. A shock absorber 26 extends between the hanger 22 and the beam 24. See P. 9, l. 2 to p. 10, l. 7.

The assembled beam 24 shown in Figures 1-3 includes: an inverted U-shaped top channel 40 having a pair of spaced-apart sidewalls 42 with semi-circular shaped cutouts 45 (p. 10, ll. 13-19; p. 11, ll. 3-6); a bushing assembly 23 including a beam mounting tube 32, into which is press fitted a pivot bushing 34 surrounding a metal sleeve 38 (p. 9, ll. 16-24); an inverted U-shaped beam insert 55 disposed inside the beam top channel 40 (p. 11, ll. 20-26); an axle mounting plate 43 including a front portion 44 and a rear portion 36, with the rear portion 36 having a semi-circular shaped recess 46 (p. 10, l. 20 to p. 11, l. 10); an angle-shaped plate 47 having a vertical front portion 49 and a horizontal rear portion 50 for

mounting and supporting the air spring 25 (p. 11, ll. 11-16); and a U-shaped rib 51 (p. 11, ll. 16-19).

“Preassembly” of the beam 24 includes at least welding the axle mounting plate 43 to the beam sidewalls 42. Pierce states that “when beam 24 is preassembled the axle mounting plate rear portion seats in sidewall cutouts 45” (p. 11, ll. 9-10) and is welded to the sidewalls 42:

**\*9** It is important to note that during preassembly of beam 24, a single continuous weld 58 is utilized to securely interconnect each beam sidewall 42 to its respective insert sidewall 57 and axle mounting plate 43, thereby eliminating the need for subassembly of each component.

(P. 11, ll. 26-30.)

Pierce states that “beam 24 preferably is preassembled prior to mounting axle 28 thereon” (p. 12, ll. 3-4), which indicates that while it is preferred, the beam does not have to be preassembled prior to mounting the axle thereon. Pierce also explains that “it is understood that beam 24 can be incorporated into suspension assembly 21 without preassembly of the beam, and the concept of the present invention will be unaffected.” (P. 10, ll. 10-13.)

Pierce discloses that the recess in the axle mounting plate can have a smaller diameter than the axle and that the axle is forced into the recess:

As best shown in FIG. 11, axle mounting plate rear portion 36 defines semicircular recess 46 having a diameter D1 which is equal to or slightly smaller than an outside diameter D2 of the smallest axle which will be mounted on beam 24. ... Axle 28 is force fit into recess 46 by the application of an appropriate amount of force using any suitable means such as a hydraulic press (not shown).

(P. 12, ll. 10-17.)<sup>[FN2]</sup>

Pierce discloses that forcing the axle into the recess creates generally uninterrupted contact with the recess 46 in the axle mounting plate 43:

More specifically, merely force fitting axle 28 into beam recess 46 only would serve to create generally uninterrupted contact and possibly areas of clearance within the recess between the outer surface of the upper portion of the axle and the bottom surface of axle mounting plate 43.

(P. 12, ll. 24-28.)

In the preferred embodiment, “[t]he appropriate force or load is applied to axle mounting plate rear portion 36 not only to force fit axle 28 into recess 46, but also to intentionally deform the axle in the axle mount area from its generally round cross-sectional shape to a generally oval or elliptical shape, as best shown in FIG. 12” (p. 12, ll. 20-24).

The purpose of the force fit is to eliminate any clearance between the outer surface of the upper portion of the axle and the bottom surface of the axle mounting plate and to create a constant preload or compression condition between the contacting surfaces:

However, the present invention goes well beyond a simple force or press fit, such that the application of an appropriate amount of force to axle mounting plate 43 bearing on axle 28, eliminates any clearance between the outer surface of the upper portion of the axle and the bottom surface of the axle mounting plate. Such lack of clearance effects intimate contact between the outer surface of the upper portion of axle 28 and the bottom surface of axle mounting plate 43 in the area of recess 46, resulting in a preload or compression condition between the contacting surfaces.

**\*10** (P. 12, l. 28 to p. 13, l. 6; *see also* p. 5, ll. 5-9.)

Pierce recognizes that deformation of the axle is not necessarily required to eliminate clearance between the axle and the mounting plate:

It is believed that such a preload or compression condition can exist without actual deformation of axle 28, as long as lack of clearance between the axle and the axle mounting plate exists.

(P. 13, ll. 6-8.)

Another important feature of Pierce is the manner of welding the preassembled beam 24 to the axle. Pierce discloses that a cutout 60 is formed in the front portion 49 of plate 47 to provide access to a window 61 in the axle mounting plate rear portion 36 (*see* Figure 8) and, similarly, a cutout 62 is formed in the axle mounting plate front portion 44 to provide access to a window 63 formed in axle mounting plate rear portion 36 (*see* Figure 9) (p. 13, ll. 17-24). Cutouts 60, 62 provide access for placing continuous welds 71, 73 in windows 61, 63, respectively (p. 13, ll. 24-27). As shown in Figure 8, continuous weld 71 is used to weld the peripheral edge of window 61 in mounting plate 43 to axle 28.

Pierce states:

Without cutouts 60, 62, preassembly of beam 24 and subsequent welding in windows 61, 63 would be impossible, resulting in the requirement that beam 24 be built-up around axle 28 and adding unwanted and costly assembly steps to the manufacturing process of axle/suspension system 20.

(P. 13, l. 27 to p. 14, l. 1.) Thus, Pierce teaches that without cutouts 60, 62 for access for welding in windows 61, 63, the beam has to be built up around the axle, which we understand would necessarily require welding the axle mounting plate 43 to the axle 28 (e.g., by using continuous weld 71 in window 61) *prior to* welding the axle mounting plate 43 to the U-shaped channel 40.

***Pierce Affidavit, Figures 1 and 2, and Stress Report***

With the “Comments by Third Party Requester Under 37 CFR § 1.947 to Patent Owner's April 23, 2004, Response,” filed June 24, 2004 (“Comments”), Requester submitted the Pierce Affidavit (Pierce is the first-named inventor on the Pierce references), to which are attached two drawings labeled Figure 1 and Figure 2 dated December 3, 1997, and an incomplete copy of the November 24, 1998, Stress Report.<sup>[FN3]</sup> Requester explains that this evidence is cited “in order to rebut the patent owner's Response” (Comments at 3).

The Examiner relies on the affidavit, the drawings, and the report in the discussion of the anticipation rejection (Rgt. of Appeal Notice 25-27; Ans. 31, 35).

The only mention of this evidence in Patent Owner's brief is in the discussion of the rejection of claims 18, 27, and 42, wherein Patent Owner criticizes the Examiner's reliance (e.g., Rgt. of Appeal Notice 24) on “a clearly biased statement provided by the third party requester” (Owner's Br. 22), presumably referring to the Pierce Affidavit. It is therefore necessary to consider whether Patent Owner had any obligation to address these documents and, if so, how to treat Patent Owner's failure to address them. Rejections in *inter partes* reexamination, like those in *ex parte* reexamination, are limited to prior art consisting of patents or printed publications. *See* 35 U.S.C. §§ 311(a) & 301; 37 C.F.R. § 1.906(a). The Pierce Affidavit is clearly not prior art or a printed publication because it was prepared during the reexamination. Figures 1 and 2 and the Stress Report have not been shown to be publicly available so as to qualify as prior art “publications.”

\*11 In any case, because the rejection of most of the claims is based on inherency, the above evidence can be useful if it qualifies as admissible extrinsic evidence used to demonstrate inherency in the Pierce references.

To serve as an anticipation when the reference is silent about the asserted inherent characteristic, such gap in the reference may be filled with recourse to extrinsic evidence. Such evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill.

*Metabolite Laboratories, Inc. v. Laboratory Corp. of America Holdings*, 370 F.3d 1354, 1368 (Fed. Cir. 2004) (quoting

*Continental Can Co. v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991)). However, such evidence must be submitted in accordance with the rules governing *inter partes* reexaminations. Requester asserts that these documents are provided “in order to rebut the patent owner's Response” (Comments 3), presumably to show compliance with 37 C.F.R. § 1.948(a)(2).<sup>[FN4]</sup>

### **Figures 1 and 2**

The Pierce Affidavit states that “FIGS. 1 and 2 further show that The Boler Company [the Third-Party Requester] contemplated attaching/welding the axle mounting plate (axle connector) to the axle before attachment/welding to the other portions of the suspension beam (pivot arm)” (Pierce Affidavit ¶ 6). Although we have no reason to doubt that this is true, the figures are being offered as independent evidence of anticipation of claim 1 (albeit based on a document that is neither a patent nor a printed publication and thus cannot serve as the basis for a rejection during reexamination) rather than as extrinsic evidence of inherency in the Pierce references or evidence tending to rebut the response by Patent Owner, as asserted in the Comments. Therefore, the figures are not entitled to consideration. 37 C.F.R. § 1.948. For the same reasons, we will give no consideration to Mr. Pierce's testimony about these figures (Pierce Aff. ¶ 6).

### **Stress Report**

Most of the remainder of Mr. Pierce's testimony is based on the Stress Report.

Mr. Pierce's affidavit, executed May 19, 2004, indicates that he is employed as a Director of Engineering at Hendrickson Trailer Suspension Systems, a position he has held for approximately twelve years (Pierce Aff. ¶ 1). However, Mr. Pierce does not claim to be, nor is he characterized by Requester as, an expert in materials science, as is necessary for him to offer any helpful independent insights into some of the inherency issues before us, such as whether the axle connector undergoes elastic deformation. However, his experience qualifies him to address some other matters before us, such as whether the axle connector is repositionable on the axle before being welded thereto. Also, he testifies that the Stress Report “was directed to an axle/suspension system which is the subject of the [the Pierce references]” (Pierce Aff. ¶ 4).

\*12 The Stress Report describes the objectives and background of the report as follows:

#### **1.0 Objective/Background**

A stress analysis of a developmental axle/suspension beam assembly was performed. The objectives of the analysis were to: 1) calculate the force required to assemble the axle into the suspension beam, and 2) perform an overall assessment of the axle press fit including determining residual stresses in the axle and half wrap<sup>[FN5]</sup>, yielding in the axle and suspension beam caused by pressing the axle into the beam, and contact forces (pressures) between the axle and half wrap.

Hendrickson is in the process of developing a trailer suspension that incorporates a tubular axle that is press fit into a fabricated suspension beam. ... The press fitting operation has as one of its functions to generate compressive stresses in the axle. The compressive stresses are intended to improve the fatigue life of the weld between the axle and beam. ... The analysis described in this report has as its goal to evaluate how the press fit affects stresses in the axle, particularly to the stresses in the weld window region of the axle.

Stress Report 4.

Testing was conducted using “a finite element model of one suspension beam plus a portion of the axle that fits into the beam” (*d.*). The finite element model “consists of one half of the suspension beam and axle, taking advantage of the symmetry of the beam. The axle was extended 3 inches beyond the edge of the suspension beam, to include stiffening effects of the long axle.” (*Id.*) The beam structure depicted in Figures B-2 and C-3 of the Stress Report appears to be identical to the beam structure depicted in Figures 1-3 and 8 of Pierce.



The Stress Report (at 5-6) describes two types of load conditions: (a) “Load Case 1 - Interference Fit”; and “Load Case 2 - Press Fit.” The discussion of Load Case 1 explains that “[d]eformations of the axle and beam are shown in Figures B1 and B2” (of which Figure B2 has been provided) and that

[a]s a consequence of the larger diameter axle fitting into the smaller diameter cutout of the suspension beam, the axle has ovalized to fit into the cutout while forcing the suspension beam to ‘arch’ slightly to accommodate the axle.

The suspension beam ‘opens up’ by approximately 0.1 inches at either end in the assembled position.

Stress Report 5. Furthermore, the half wrap thus deformed applies compressive force to the axle: “The maximum *compressive* principal stresses (SP1) occur at the pinch points in the axle, which are below the weld windows, see Figures B8 and B9. The peak compressive principal stresses in these areas are 80-100 ksi.” *Id.* The contact pressures at the pinch points are “10,000 psi and greater” (*id.* at 6, § 3.2).

**\*13** The discussion of “Load Case 2 - Press Fit” indicates that “[t]he overall deformation and stress response of the beam and axle for the press fit is nearly identical to the interference fit.” *Id.* at 6.

Mr. Pierce testified:

The Stress Report unequivocally shows that when the axle is forced into the axle mounting plate (axle connector) recess, ... then elastic deformation of the axle mounting plate occurs, as well as a preload or compression between the axle mounting plate and the axle that occurs when the axle mounting plate “springs back” after fitting of the axle into the axle mounting plate.

(Pierce Affidavit ¶ 7.) This characterization of the Stress Report is only partly correct. The above-discussed parts of the Stress Report disclose that insertion of the axle results in elastic deformation of the axle mounting plate (i.e., axle connector), as recited in claim 2, because the beam deforms.<sup>[FN6]</sup> However, the Stress Report does not describe the axle mounting plate as moving back toward its undeformed position, as we have determined is required by the term “spring back” in claim 16. Mr. Pierce's testimony appears to use the term “springs back” to mean having a tendency to move back toward the undeformed position, which we have held does not satisfy the claims.

Mr. Pierce further testified that “if an axle is first pressed into an axle mounting plate (axle connector) before the axle mounting plate is connected to the other components of the suspension beam, elastic deformation of the axle mounting plate still would occur” (Pierce Affidavit ¶ 7). This testimony is apparently directed at dependent claim 2, which specifies that elastic deformation of the axle connector holds it in contact with the axle before the axle connector is welded to the pivot arm. This testimony is persuasive. It necessarily follows that a half wrap which elastically deforms when an axle is inserted *after* the half wrap has been welded to the pivot arm will elastically deform if the axle is inserted into the half wrap *before* it is welded to the pivot arm.

Mr. Pierce also states that “[t]he axle mounting plate can be repositioned in a number of ways on the axle, such as by tapping it with a mallet or the like, prior to welding the axle mounting plate to the axle” (Pierce Affidavit ¶ 9). This statement is relevant to claims 18, 27, and 42. We give weight to Mr. Pierce's testimony to the extent it is offered to establish that the axle mounting plate is capable of being repositioned on the axle. Since the axle connector is held onto the axle by a compressive force, only friction prevents the axle connector from being repositioned on the axle and this friction can be overcome by mechanical force. Although Patent Owner considers the statement to be biased (Owner's Br. 22), Patent Owner provides no explanation of why the statement is erroneous.

#### ***Other testimony in the Pierce Affidavit***

**\*14** Mr. Pierce still further states:

The Stress Report discusses yielding of the axle and suspension beam, and also plastic strain that occurs due to this yielding. In further developments of the axle/suspension system that was the subject of the Stress Report and that

resulted in a commercial embodiment axle/suspension system sold by Boler, the yield strength of the axle mounting plate (axle connector) and the axle were increased, so that all of the strains as a result of the assembly process are elastic. Therefore, there is no plastic strain or yielding during assembly of the commercial embodiment axle/suspension system, rather only elastic deformation occurs.

(Pierce Affidavit ¶ 7.) The commercial embodiment referred to in this statement is not disclosed in either the Stress Report or the Pierce references and thus is not entitled to any weight for establishing inherency.

#### **Anticipation - Claims 1-6, 16, 17, and 19-24**

##### **Claims 1, 4-6, and 24**

Claim 1 is reproduced below (without underlining):

1. A method of manufacturing a vehicle suspension system, the method comprising the steps of:  
welding an axle connector to an axle, without first pressing the axle connector onto the axle from an end of the axle, and without using a clamp to hold the axle connector in contact with the axle; and  
then welding the axle connector to a pivot arm.

Patent Owner argues that Pierce describes the opposite order of assembly from claim 1, wherein the beam 24 (corresponding to the claimed “pivot arm”), including the axle mounting plate 43 (corresponding to the claimed “axle connector”), is preassembled by welding before attaching and welding the axle 28 to the beam 24 (Owner's Br. 6).

The Examiner agrees that that is described as the preferred method of assembly but finds that other teachings in Pierce disclose the order of assembly in claim 1. The issue is whether Pierce describes the order of assembly of claim 1.

The Examiner first relies on this statement in Pierce (p. 10, ll. 8-13):

In accordance with one of the key features of the present invention, rigid beam 24 *preferably* is *preassembled* prior to its incorporation into suspension assembly 21. *However, it is understood that beam 24 can be incorporated into suspension assembly 21 without preassembly of the beam, and the concept of the present invention will be unaffected.* [Emphasis added.]

Patent Owner argues that this portion of Pierce merely teaches that it is not necessary to preassemble the beam 24, but does not teach the specific manufacturing method recited in claim 1 (Owner's Br. 7).

The Examiner responds:

The use of the word “understood” is a clear and unequivocal signal that one of ordinary skill in the axle/suspension system art understands that the axle connector/axle mounting plate 43 could be attached to axle 28 prior to incorporation of the axle mounting plate into the other portions of the beam. It is clear from this quotation that the axle can be mounted prior to forming the beam preassembly.

**\*15** (Ans. 30, adopting the Requester's contention at Requester's Br. 7.)

We agree with Patent Owner that the statement that “beam 24 can be incorporated into suspension assembly 21 without preassembly of the beam” does not, in isolation, teach the order of assembly in claim 1. The Examiner apparently interprets the statement as broadly teaching assembly of the suspension components in any order, and that since there are only a limited number of ways of assembling the beam, axle mounting plate, and axle, Pierce necessarily teaches them all. For example, the Examiner explains the three possible ways to assemble the axle and beam (Ans. 37-41) and states: “Pierce must have tried all three of the sequential variations in order to decide which possibility was preferred. Pierce inherently had to recognize the other two sequential possibilities to arrive at a preferred method.” (Ans. 41.) While this reasoning may be persuasive in an obviousness rejection, where one can combine the teachings in a reference with the knowledge



of one of ordinary skill in the art, anticipation requires that the reference describe the claimed subject matter, expressly or inherently. This portion of Pierce does not describe the order of assembly.

However, the Examiner additionally relies on Pierce's statements that it "is important to note that during **preassembly** of beam 24, a single continuous weld 58 is utilized to securely interconnect each beam sidewall 42 to its respective insert sidewall 57 and axle mounting plate 43, thereby eliminating the need for subassembly of each component" (emphasis added) (p. 11, ll. 26-30) and "beam 24 **preferably** is **preassembled** prior to mounting axle 28 thereon" (emphasis added) (p. 12, ll. 3-4). The Examiner finds that these statements teach that the axle mounting plate 43 can be welded to the axle 28 before the axle mounting plate 43 is welded to the other components of beam 24 (Rgt. of Appeal Notice 15; Ans. 35-37).

Patent Owner does not address these teachings of Pierce.

We agree with the Examiner that Pierce teaches that "preassembly" involves, at least, welding the axle mounting plate 43 to the sidewall 42 of the beam 24. This statement clarifies that "preassembly" in the prior statement that "beam 24 can be incorporated into suspension assembly 21 without preassembly of the beam, and the concept of the present invention will be unaffected" (p. 10, ll. 11-13) means welding at least the axle mounting plate 43 to the beam 24. That "beam 24 **preferably** is **preassembled** prior to mounting axle 28 thereon" teaches that a nonpreferred method of assembly is to mount axle 28 before preassembling the beam 24, i.e., to weld the axle mounting plate 43 to the axle 28 before welding the axle mounting plate 43 to the other components of beam 24. This is confirmed by a later teaching of Pierce, addressed infra, not noted by the Examiner or Requester.

\*16 Pierce discloses that a cutout 60 is formed in the front portion 49 of plate 47 to provide access to a window 61 in the axle mounting plate rear portion 36 (*see* Figure 8) and, similarly, a cutout 62 is formed in the axle mounting plate front portion 44 to provide access to a window 63 formed in axle mounting plate rear portion 36 (*see* Figure 9) (p. 13, ll. 17-24). Cutouts 60, 62 provide access for placing continuous welds 71, 73 in windows 61, 63, respectively (p. 13, ll. 24-27). Pierce states:

Without cutouts 60, 62, preassembly of beam 24 and subsequent welding in windows 61, 63 would be impossible, resulting in the requirement that beam 24 be built-up around axle 28 and adding unwanted and costly assembly steps to the manufacturing process of axle/suspension system 20.

(P. 13, l. 27 to p. 14, l. 1.) This teaches that without cutouts 60, 62 for access for welding in windows 61, 63, the beam would have to be built up around the axle, which necessarily requires welding the axle mounting plate 43 to the axle 28 **prior to** welding the axle mounting plate 43 to the beam 24. Although this is not a preferred method of assembly due to "adding unwanted and costly assembly steps to the manufacturing process," it is an additional teaching of the order of assembly in claim 1.

Therefore, we find that Pierce describes the order of assembly of claim 1. The rejections of claims 1, 4-6, and 24 over Pierce PCT and Pierce US are affirmed.

## Claim 2

Claim 2 recites:

2. The method according to Claim 1, wherein in the step of welding the axle connector to axle, the axle connector is held in contact with the axle by elastically deforming the axle connector.

The Examiner refers to page 12, line 15 to page 13, line 16 of Pierce PCT, which discloses forcing an axle of diameter D2 into a recess of diameter D1, where D1 is smaller than D2, resulting in a preload or compression between the contact surfaces. The Examiner finds:

The axle connector will [inherently] expand upon insertion of the axle, while elastically holding the axle in the axle

connector. The process of Pierce et al. which force fits the axle into the axle connector (axle mounting plate) would [inherently] elastically deform the axle connector. The elastic deformation of the axle connector specified in claim 2 merely is another way to describe the preload or compression between the axle mounting plate and the axle taught in Pierce et al.

(Rgt. of Appeal Notice 6; Ans. 9.) The Examiner also made this finding of inherency at page 4 of the February 24, 2004, Office Action.

Patent Owner notes that Pierce only describes deforming the axle 28 from its generally round cross-sectional shape to a generally oval or elliptical shape when it is pressed into the recess 46 and does not describe “deforming” or “elastically deforming” the axle mounting plate 43 (axle connector) (Owner's Br. 8). It is argued that preload or compression between the axle mounting plate 43 and the axle 28 does not inherently produce elastic deformation of the mounting plate as alleged by the Examiner because “[t]he Pierce references themselves state that the preload or compression on the axle 28 can be produced without deformation of the axle” (Owner's Br. 9). It is argued: “Perhaps the sidewalls 42 provide the rigidity which allows the axle 28 to be deformed when it is extruded into the recess 46. Perhaps the axle 28 is provided with the preload or compression without deformation of the axle (as suggested by Pierce).” (Owner's Br. 9.)

**\*17** The issue is whether Pierce describes, expressly or inherently, that “the axle connector is held in contact with the axle by elastically deforming the axle connector.”

Patent Owner's arguments are not persuasive. It is true that Pierce does not expressly describe “elastically deforming” the axle mounting plate 43 (axle connector) when the axle is inserted, i.e., Pierce does not mention the words “elastically deforming.” However, the anticipation rejection is based on inherency and Patent Owner fails to address the relevant teachings of Pierce noted by the Examiner.

We found in the analysis of claim 1 that Pierce discloses that the axle mounting plate 43 can be welded to the axle 28 before welding the mounting plate 43 to the beam 24, although this is not a preferred method of assembly due to it “resulting in the requirement that beam 24 be built-up around axle 28 and adding unwanted and costly assembly steps to the manufacturing process of axle/suspension system 20” (p. 13, l. 29 to p. 14, l. 1). The axle mounting plate 43 has recess 46 with a diameter D1 that is smaller than the diameter D2 of the axle 28 and the axle is forced into the recess 46 (p. 12, ll. 10-17). Although the axle is deformed in the preferred embodiment, Pierce teaches that the preload or compression condition can exist without deformation of the axle 28 (p. 13, ll. 6-8), as noted by Patent Owner, and it is this teaching that we rely on for simplicity of explanation. When the axle is forced into the smaller diameter recess, it is inherent that the axle mounting plate has to be deformed (undergo a dimensional change by being expanded) to accommodate the axle when the axle itself is not deformed. Since the insertion of an axle into an axle connector having a smaller diameter than the axle is one of the two mechanisms for “elastically deforming the axle connector” disclosed in the '[393 patent](#)' (the other being spreading apart the ends of an axle connector extending more than 180° about the axle) ('[393 patent](#)', col. 2, l. 66 to col. 3, l. 9), it is inherent that the axle mounting connector in the Pierce references is deformed just as in the '[393 patent](#)'. In addition, as discussed in connection with the Stress Report, the Stress Report demonstrates that the axle connector is deformed when the axle is inserted into the axle connector after it is welded to the pivot arm and we agree with Mr. Pierce's testimony that the axle connector would necessarily deform if the axle is inserted into axle connector before it is welded to the pivot arm.

The fact that there is a “compression condition between the contacting surfaces” (p. 13, ll. 5-6) of the axle mounting plate and the axle teaches that the axle mounting plate has been elastically deformed, i.e., after it is deformed, the axle mounting plate tries to return to its original shape and exerts compressive force on the axle. There would be no compressive force if the axle mounting plate were not elastically deformed, i.e., if it were permanently (plastically) de-

formed. To meet claim 2, the compressive force only needs to be enough to hold the axle mounting plate in contact with the axle.

**\*18** Patent Owner's argument that compression between the axle mounting plate 43 and the axle 28 does not inherently imply elastic deformation of the mounting plate is unpersuasive. "Compression" requires that the axle mounting plate 43 exerts a force against the axle 28, which must be due to the axle mounting plate trying to return to its original shape after being elastically deformed by the larger diameter axle, just as in the '393 patent.

For the foregoing reasons, we hold that the Examiner was correct to find that Pierce establishes a prima facie case of anticipation by inherency even without consideration of the Stress Report and Pierce Affidavit.

The burden of proof therefore shifted to Patent Owner to produce evidence showing that the axle mounting plate will not inherently undergo elastic deformation when a larger-diameter axle is pressed into it. See *In re Schreiber*, 128 F.3d 1473, 1478 (Fed. Cir. 1997) ("The examiner ... correctly found that Harz established a prima facie case of anticipation. At that point, the burden shifted to Schreiber to show that the prior art structure did not inherently possess the functionally defined limitations of his claimed apparatus."). Patent Owner has provided no such evidence. Furthermore, the Stress Report, which Patent Owner has not addressed, supports the Examiner's finding that insertion of the axle into the axle connector will inherently cause the axle connector to undergo elastic deformation.

For the reasons stated above, we agree with the Examiner's finding that Pierce inherently discloses that "the axle connector is held in contact with the axle by elastically deforming the axle connector." Accordingly, the rejections of claim 2 over Pierce PCT and Pierce US are affirmed.

### **Claim 3**

Claim 3 recites:

3. The method according to Claim 2, wherein the elastically deforming step further comprises enlarging an inner dimension of the axle connector, so that the axle connector inner dimension is larger than an outer dimension of the axle at a location in which the axle connector is held in contact with the axle during the step of welding the axle connector to the axle.

The Examiner refers to page 12, line 10 to page 13, line 16 of Pierce PCT, which discloses forcing an axle of diameter D2 into a recess of diameter D1, where D1 is smaller than D2, resulting in a compression between the contacting surfaces. The Examiner finds that "[f]orcing a larger diameter axle into a smaller size mounting plate will inherently enlarge the diameter of the plate recess" (Rgt. of Appeal Notice 7; Ans. 9).

Patent Owner argues that Pierce does not describe enlarging an inner dimension of an axle connector (Owner's Br. 10). Patent Owner finds that Pierce shows that the inner diameter D1 of the recess 46 is the same pre-insertion (Figure 11) and post-insertion (Figure 12) of the axle 28, so the mounting plate 43 has not been "deformed" and the inner radius of the mounting plate 43 has not been enlarged (Owner's Br. 9-10), i.e., only the axle has deformed (Owner's Br. 9-10).

**\*19** The issue is whether Pierce expressly or inherently discloses "enlarging an inner dimension of the axle connector."

Patent Owner does not address the Examiner's inherency reasoning. Manifestly, when the axle is not deformed, an option we have found to be described by Pierce, forcing the axle into the recess of the axle mounting plate, where the axle has a larger diameter than the recess, will inherently cause the diameter of the recess to expand, just as disclosed in the '393 patent at column 3, lines 4-8. The inner diameter of the axle connector recess inherently will be larger than the outer dimension of the axle because it would be physically impossible for the axle connector to be inside the axle. Thus, we find

that Pierce inherently discloses “enlarging an inner dimension of the axle connector” although it does not use those words. The rejections of claim 3 over each of Pierce PCT and Pierce US are affirmed.

Patent Owner's argument that the axle mounting plate is not deformed because the inner diameter D1 of the recess is the same before and after insertion of the axle, as shown in Figures 11 and 12, is not persuasive. First, we rely on the situation where the axle is not deformed, in which case the axle mounting plate must be deformed. Second, even in the preferred embodiment of Figures 11 and 12, one of ordinary skill in the art would appreciate that Figure 12 shows the same diameter D1 after insertion of the axle as before insertion in Figure 11 because the deformation of the axle mounting plate is small compared to deformation of the axle, not because there is no deformation. As stated in *Engineering Mechanics* 25:

When loads of any type are applied to a member, the member will always undergo dimension changes. In other words, the loads alter the size and/or the shape of the body. Such dimension changes may or may not be visible to the naked eye depending on the degree to which the loads alter the body.

#### **Claim 16**

Claim 16 recites:

16. The method of claim 1, further comprising the steps of elastically deforming the axle connector over the axle, and then permitting the axle connector to spring back, thereby holding the axle connector in contact with the axle.

The Examiner finds that “[p]reload or compression of the axle means that the axle connector is elastically compressing inwardly so [sic, so as] to ‘spring back’ around the axle” (Ans. 45 ¶ 26 with respect to claim 2), that “[e]nlarging the axle connector and then allowing it to form compressive forces on the axle is representative of ‘spring back’” (Ans. 47 ¶ 28 with respect to claim 3), and with respect to claim 16:

[I]t is inherent that during the process of Pierce et al. the axle connector elastically deforms over the axle, then permitting the axle connector to spring back, thereby holding the axle connector in contact with the axle. This phenomenon occurs when the axle is forced into the axle mounting plate (axle connector), resulting in a preload or compression (elastic deformation) between the axle and the mounting plate.

**\*20** (Ans. 24.)

Patent Owner argues that Pierce describes deforming the axle 28 and describes that the inner dimension D1 of the axle mounting plate 43 does not change when the axle 28 is inserted into the recess, as discussed in relation to the rejection of claims 2, 3, and 8 (Owner's Br. 11). “Thus, Pierce does not describe deformation of the mounting plate 43, does not describe elastic deformation of the mounting plate, and does not describe any spring back of the mounting plate to hold the axle connector in contact with the axle.” (Owner's Br. 11.)

The first issue is whether Pierce expressly or inherently discloses “elastically deforming the axle connector over the axle.” We find that Pierce inherently discloses “elastically deforming the axle connector” for the reasons discussed in connection with claims 2 and 3.

The second issue is whether Pierce PCT or Pierce US expressly or inherently discloses “permitting the axle connector to spring back.”

As discussed in the Claim Interpretation section, we interpret “permitting the axle connector to spring back” to require actual movement back towards an original position as a separate method step after the step of elastically deforming. We disagree with the Examiner's interpretation that the limitation is met by producing a compressive force on the axle due to elastic deformation of the axle mounting plate because this does not account for the description in the Specification or the fact that “permitting the axle connector to spring back” is a separate method step after the step of elastically deform-

ing. The U-shaped recess in the axle mounting plate in Figure 11 of Pierce PCT and Pierce US is spread apart and elastically deformed by the axle, because the axle has a larger diameter than the recess, but the axle mounting plate is prevented from “springing back” by the axle. “Permitting the axle connector to spring back” after elastic deformation can only occur by temporarily forcing the axle connector to open up more than is necessary to receive the axle, such as by using the axle connector in the ‘393 patent which extends more than halfway about the outer surface of the axle. Thus, Figure 11 of Pierce PCT and Pierce US does not expressly or inherently describe “permitting the axle connector to spring back.” The rejections of claim 16 over Pierce PCT and Pierce US are reversed.

#### ***Claim 17***

Because we have reversed the anticipation rejections of claim 16 over Pierce PCT and Pierce US, the rejections of claim 17 over Pierce PCT and Pierce US are reversed.

#### ***Claims 19 and 21***

Claim 19 recites:

19. The method of claim 1, further comprising the steps of providing the axle connector having an inner radius less than an outer radius of the axle, then enlarging the inner radius.

**\*21** We find that the Pierce references disclose the limitations of claim 19 for the reasons discussed in connection with claims 2 and 3. The rejections of claim 19 over Pierce PCT and Pierce US are affirmed. Claim 21 is not separately argued, so the rejections of claim 21 over Pierce PCT and Pierce US are affirmed.

#### ***Claim 20***

Claim 20 recites:

20. The method of claim 19, wherein the enlarging step further comprises enlarging the inner radius to be greater than the outer radius.

We find that the Pierce references disclose the limitations of claim 20 for the reasons discussed in connection with claims 2 and 3. The rejections of claim 20 over Pierce PCT and Pierce US are affirmed.

#### ***Claims 22 and 23***

Claim 22 recites:

22. The method of claim 19, further comprising the step of permitting the axle connector to spring back after the enlarging step.

Patent Owner argues that Pierce does not describe enlarging the inner dimension D1 of the mounting plate 43 and does not describe any springing back of the mounting plate (Owner's Br. 13).

We find that the welded embodiment of Figure 11 of Pierce PCT and Pierce US does not allow “permitting the axle connector to spring back” as discussed in connection with claim 16. The rejections of claim 22 and dependent claim 23 over Pierce PCT and Pierce US are reversed.

#### ***Anticipation - Claims 8-15, 25, 26, and 28-33***

##### ***Claims 8, 9, 11-15, and 33***

Independent claim 8 recites:

8. A method of manufacturing a vehicle suspension system, the method comprising the step of:  
attaching an axle connector to an axle by elastically deforming the axle connector, the axle connector extending less

than completely about the axle when the axle connector is attached to the axle.

We find that Pierce inherently discloses “attaching an axle connector to an axle by elastically deforming the axle connector” for the reasons discussed in the analysis of claims 2 and 3. Accordingly, the rejections of claims 8, 9, 11-15, and 33 over Pierce PCT and Pierce US are affirmed.

#### ***Claim 10***

Claims 9 and 10 recite:

9. The method according to Claim 8, further comprising the steps of welding the axle connector to the axle, and welding the axle connector to a pivot arm.

10. The method according to Claim 9, wherein the axle connector is welded to the axle prior to the step of welding the axle connector to the pivot arm.

We observe that claim 9 does not expressly or impliedly recite the order of welding the axle, axle connector, and the pivot arm. See *Interactive Gift Express, Inc. v. Compuserve Inc.*, 256 F.3d at 1342-43 (absent claim language requiring the steps of a method claim to be performed in a specific order, it is improper to require the steps to be performed in the order listed). Thus, claim 9 reads on welding the axle connector to the axle before welding the axle connector to the pivot arm, as recited in dependent claim 10, and on welding the axle connector to the pivot arm before welding the axle connector to the axle, as recited in independent claim 34.

**\*22** We find that Pierce inherently discloses “the axle connector is welded to the axle prior to the step of welding the axle connector to the pivot arm,” as recited in claim 10, for the reasons discussed in the analysis of claim 1. The rejections of claim 10 over Pierce PCT and Pierce US are affirmed.

#### ***Claims 25, 26, and 28-32***

The subject matter of claims 25, 26, and 28-32 corresponds to claims 16, 17, and 19-23, respectively.

The rejections of claim 25 over Pierce PCT and Pierce US are reversed for the reasons stated with regard to claim 16. Consequently, the rejections of dependent claim 26 over Pierce PCT and Pierce US are also reversed.

The rejections of claims 28 and 29 over Pierce PCT and Pierce US are affirmed for the reasons stated with regard to claims 19 and 20, respectively. The rejections of claim 30 over Pierce PCT and Pierce US are affirmed because claim 30 has not been separately argued.

The rejections of claim 31 over Pierce PCT and Pierce US are reversed for the reasons stated with regard to claim 22. Consequently, the rejections of dependent claim 32 over Pierce PCT and Pierce US are also reversed.

#### ***Anticipation - Claims 34-41 and 43-48***

Claim 34 recites:

34. A method of manufacturing a vehicle suspension system, the method comprising the steps of:  
attaching an axle connector to an axle;  
then welding the axle connector to a pivot arm; and  
then welding the axle connector to the axle, without first pressing the axle connector onto the axle from an end of the axle, and without using a clamp to hold the axle connector in contact with the axle.

The Examiner essentially relies on the same reasoning as applied to the rejection of claim 1 (Ans. 8; Ans. 19).

Patent Owner argues that Pierce does not describe the order of assembly in claim 34 (Owner's Br. 16-17).



The issue is whether Pierce discloses, expressly or inherently, the order of assembly in claim 34.

Pierce describes welding the axle connector to the pivot arm before assembling and welding the axle connector to the axle (the preferred embodiment). Pierce also describes welding the axle connector to the axle before welding the axle connector to the pivot arm (a nonpreferred method of assembly requiring the beam to be built up around the axle which is undesirable because it adds unwanted and costly assembly steps), as discussed in connection with claim 1. However, Pierce does not expressly or inherently describe the assembly steps of claim 34 in which the axle is attached (but not welded) to the axle connector, the axle connector is welded to the pivot arm, and then the axle connector is welded to the axle. The Examiner's finding that Pierce discloses all methods of assembly because Pierce states that "beam 24 can be incorporated into suspension assembly 21 without preassembly of the beam, and the concept of the present invention will be unaffected" (Pierce PCT, p. 10, ll. 11-13) is incorrect for an anticipation rejection, as noted in connection with claim 1. The anticipation rejections of claim 34 and its dependent claims 35-41 and 43-48 over Pierce PCT and Pierce US are reversed.

**\*23** A new ground of rejection for obviousness is added, *infra*.

***Obviousness - Claims 18, 27, and 42***

Claims 18, 27, and 42 recite the step of "repositioning the axle connector on the axle prior to the step of welding the axle connector to the axle." The '393 patent discloses that "[p]rior to welding, the axle connector 36 may be relatively easily repositioned on the axle 24 for alignment purposes, etc." (col. 3, ll. 26-28).

The Examiner concludes that the repositioning step would have been obvious "so that the components can be properly aligned prior to being permanently joined in place by welding" (Rgt. of Appeal Notice 24; Ans. 27). The Examiner notes that the Pierce Affidavit states that relocation could be accomplished in many ways, such as by tapping with a mallet or the like (Pierce Affidavit ¶ 9).

Patent Owner argues that the only foundation provided by the Examiner for the assertion that the claimed invention would have been obvious "is a clearly biased statement provided by the third party requester in the reexamination proceeding" (Owner's Br. 22), i.e., the Pierce Affidavit, and that this is not a proper basis for a prima facie showing of obviousness.

The Examiner responds that relocation of parts is done before welding to ensure that the parts are in proper alignment prior to welding (Ans. 69).

The issue is whether it would have been obvious to reposition the axle mounting plate on the axle prior to welding.

Obviousness is determined from the perspective of one of ordinary skill in the art to which the subject matter pertains. 35 U.S.C. § 103(a). A person of ordinary skill in the art would have recognized the problem that the axle mounting plate may wind up out of alignment axially or angularly on the axle when the axle is forced into the recess of the axle mounting plate by the hydraulic press in Pierce PCT or Pierce US due to friction, uneven pressing force, etc. One of ordinary skill in art would have recognized that the obvious solution is either to remove the axle mounting plate and to try to press it on again in the correct position or to reposition the axle connector while it is still on the axle. See *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1742 (2007) ("One of the ways in which a patent's subject matter can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims."). Such problems and solutions are known from common, everyday experience, e.g., when aligning two pieces of paper before stapling them together one can either separate the papers and put them together again or can reposition the papers to put them in alignment. One skilled in the art, and, indeed, one with ordinary common know-



ledge, would have appreciated that small differences from the desired position are easily achieved by repositioning.

**\*24** Mr. Pierce testified that the axle mounting plate is capable of being repositioned, and we do not think this is reasonably in question since the axle mounting plate is held onto the axle only by compressive force and friction. Even if the axle was deformed to prevent repositioning of the axle mounting plate angularly on the axle, the axle mounting plate could still be repositioned axially. Accordingly, we conclude that one of ordinary skill in the art would have been motivated to reposition the axle mounting plate on the axle prior to welding to ensure proper alignment of the axle mounting plate on the axle and with respect to each other as stated by the Examiner. Patent Owner has not shown reversible error in the Examiner's reasoning. The rejection of claim 18 over Pierce PCT and Pierce US is affirmed.

Claim 27 depends on claim 26 which depends on claim 25, and the rejections of claims 25 and 26 over Pierce PCT and Pierce US have been reversed. The obviousness rationale does not cure the deficiency with respect to claim 25. Thus, the rejections of claim 27 over Pierce PCT and Pierce US are reversed.

Claim 42 depends on claim 34. The anticipation rejection of claim 34 over Pierce PCT and Pierce US has been reversed. However, we conclude that Pierce PCT and Pierce US renders obvious the subject matter of claim 34, as discussed in the new ground of rejection. Therefore, we affirm the obviousness rejections of claim 42 over Pierce PCT and Pierce US.

#### NEW GROUNDS OF REJECTION UNDER 37 C.F.R. § 41.77(b)

##### 1.

Claims 34-38, 43, 44, 47, and 48 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Pierce PCT and Pierce US.

We found in connection with the anticipation rejection of claim 34 that Pierce PCT and Pierce US do not expressly or inherently disclose the assembly steps in which the axle is attached (but not welded) to the axle connector, the axle connector is welded to the pivot arm, and then the axle connector is welded to the axle. However, we agree with the Examiner's finding (Ans. 37-41) that there are only three ways to assemble and weld the three parts of an axle connector, an axle, and a pivot arm: (1) weld the axle connector to the pivot arm and then weld the axle connector to the axle (the preferred embodiment of Pierce); (2) assemble the axle connector to the axle, then weld the axle connector to the axle, and then weld the axle connector to the pivot arm (recited in claim 1, the nonpreferred embodiment in Pierce); or (3) assemble the axle connector to the axle, then weld the axle connector to the pivot arm, and then weld the axle connector to the axle, (recited in claim 34). We find that one of ordinary mechanical skill in the art of welding together assemblies would have known that the order of assembling pieces can be varied for many reasons, such as convenience, simplifying assembly, reducing distortion caused by welding, etc. We conclude that one of ordinary skill in the art would have been motivated to use any known method of assembly, including the method in claim 34, because it one of a limited number of options and because the order of assembly has not been shown to be important in Patent Owner's design.

**\*25** We discourage examiners from relying on "design choice" because it is generally a mere conclusion, which is no substitute for obviousness reasoning based on factual evidence. However, "design choice" is appropriate where the applicant fails to set forth any reasons why the differences between the claimed invention and the prior art would result in a different function or give unexpected result. See *In re Chu*, 66 F.3d 292, 298-99 (Fed. Cir. 1995). "Design choice" has been used where the claims recite one of many possible alternatives that would have been apparent to a person of ordinary skill in the art. See *In re Dailey*, 357 F.2d 669, 672- 73 (CCPA 1966) ("Appellants have presented no argument which convinces us that the particular configuration of their container is significant or is anything more than one of numerous configurations a person of ordinary skill in the art would find obvious for the purpose of providing mating sur-

faces in the collapsed container of Matzen.”). In this case, Patent Owner provides no reason why the order of assembly is anything more than a design choice. The order of assembly of claim 34 would have been obvious variation of the two disclosed orders of assembly in Pierce PCT and Pierce US.

Claims 35, 36, 43, and 44 are rejected over Pierce PCT or Pierce US for the reasons discussed with respect to claims 2, 3, 19, and 20, respectively.

Claim 37 is rejected because Pierce PCT and Pierce US disclose that in the step of welding the axle connector to the axle, no clearance exists between the axle connector and the axle. *See, e.g.*, Pierce PCT, p. 5, ll. 5-9.

Claim 38 recites that “the axle connector is a single structure which extends greater than halfway about the axle.” As a matter of claim interpretation, claim 38 does not recite that the axle connector extends more than halfway about the axle “outer surface”; compare claim 39. Figures 11 and 12 of Pierce show short distinct straight sections between the semicircular portion of recess 46 and the lowermost edges 81, 83. These straight sections are evidently intended to support the axle when it is deformed and elongated in the U-shaped recess, as shown in Figure 12, and to prevent the axle from popping out of the recess as it might if the recess only extended halfway around the axle. Nevertheless, the teaching applies even if the axle is not deformed. The axle mounting plate extends more than halfway about the axle because the short straight sections extend past the largest diameter of the axle. In addition, Figure 1 shows the axle mounting plate extending greater than halfway about the axle.

Claim 47 recites “attaching the axle connector to the axle from a lateral direction relative to the axle.” There is no question that the axle is inserted from the side in the Pierce references, as seen in Figures 11 and 12.

**\*26** Claim 48 recites “holding the axle connector in contact with the axle, prior to the step of welding the axle connector to the pivot arm.” The axle connector is held in contact with the axle in the Pierce references by compressive force of the axle connector on the axle due to the axle being inserted into a recess with a smaller diameter. This does not change if the axle connector is welded to pivot arm before it is welded to the axle. The step of holding is inherently performed before the step of welding.

We note that the original rejection of claim 42 under [§ 103\(a\)](#) over Pierce PCT and Pierce US was affirmed.

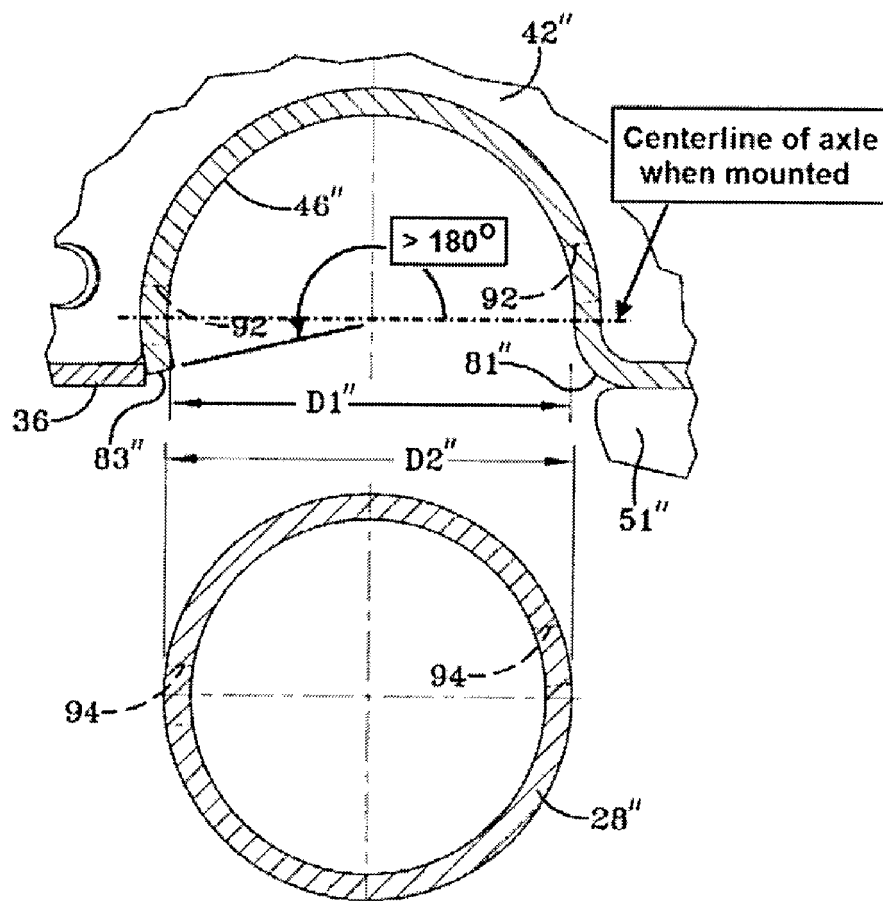
2.

Claims 39-41, 45, and 46 are rejected under [35 U.S.C. § 103\(a\)](#) as being unpatentable over Pierce US.

Claim 39 recites that “the axle connector extends greater than 180° about the axle outer surface.” This limitation requires that the axle connector extends about the “axle outer surface,” i.e., in contact with the axle surface over more than 180°, and not just about the “axle” as in claim 38. The Examiner finds that in “Figure 1 [of Pierce] it is clear that the connector plate extends at least 180 degrees around the 360 degree axle” (Ans. 10). The claim language is “greater than 180°,” not “at least 180 degrees.” This is significant because “at least 180 degrees” is met by 180° whereas “greater than 180°” requires that the axle connector extends more than halfway around the axle surface as disclosed in the ['393 patent](#).

The first embodiment of Figure 1 of Pierce PCT and Pierce US does not show the axle mounting plate wrapping more than 180° about the outer surface of the axle. However, the third embodiment in Figures 20 and 21 of Pierce US shows an axle mounting plate extending more than 180° around the axle outer surface.

An annotated version of Figure 20 of Pierce US is reproduced below:



**FIG-20**

Figure 20 illustrates the cross-section of an axle mounting plate having a semicircular recess 46 with a diameter D1 at the top of the figure and the cross-section of a round axle 28 with a diameter D2 at the bottom of the figure, i.e., before the axle is inserted into the recess. Holes 92 in the axle mounting plate are intended to align with holes 94 in the axle when the axle is inserted into the recess to receive bolts (col. 10, ll. 51-54). A dashed line has been added to the cross-section of the axle mounting plate to show where the centerline of the axle will be when the axle is inserted. One hole 94 in the axle is aligned along the horizontal axis of the axle and is intended to align with the left hole 92 in the axle mounting plate. The axle mounting plate extends around past the left hole 92 and, so, Figure 20 discloses an axle mounting plate which “extends greater than 180° about the axle outer surface” as recited in claim 39, when the axle is inserted.

**\*27** The only significant difference between the first and third embodiments is that the first embodiment uses welds to attach the axle connector to the axle, while the third embodiment uses bolts (col. 10, ll. 40-47). Pierce US teaches one skilled in the art that the axle mounting plate can have the configuration of Figures 11 and 12 or the configuration of Figures 20 and 21. Since Pierce US does not expressly disclose that the axle mounting plate of the bolted embodiment of Figure 20 can be used in the welded embodiment of Figure 11, it does not anticipate. See *Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d 1376, 1383, 58 USPQ2d 1286, 1291 (Fed. Cir. 2001) (For anticipation: “The invention must have been known to the art in the detail of the claim; that is, all of the elements and limitations of the claim must be shown in a single prior reference, arranged as in the claim.”). Nevertheless, it would have been obvious to one of ordin-

ary skill in the art to use the axle mounting plate of Figure 20 for the welded embodiment because it is expressly taught as an alternative way to construct the axle mounting plate.

Substitution of the axle mounting plate of the bolted embodiment of Figure 20 for the welded embodiment of Figure 11 of Pierce US meets the limitation that the axle mounting plate “extends greater than 180° about the axle outer surface” as recited in claim 39. when the axle is inserted

Claim 40 recites “permitting the axle connector to spring back” after the step of elastically deforming the axle connector. Claim 45 recites “permitting the axle connector to spring back” after the step of enlarging the inner radius. Substitution of the axle mounting plate in Figure 20 in the welded embodiment of Figure 11 of Pierce US inherently permits the axle mounting plate to spring back after the axle is inserted because the axle mounting plate extends more than 180° around the axle outer surface, just as described in the '393 patent at column 2, line 55 to column 3, line 10.

With regard to claim 41, the step of permitting the axle connector to spring back is inherently performed prior to the step of welding the axle connector to the axle because the permitting step occurs during assembly of the axle to the axle mounting plate.

The step of permitting the axle connector to spring back inherently “comprises decreasing the inner radius,” as recited in claim 46. The axle mounting plate extends more than halfway around the outer surface of the axle in Figure 20 of Pierce US, just as in the '393 patent. The diameter D1 of the axle mounting plate recess 46 in Figure 20 is enlarged when the axle is inserted (because the ends 81 and 83 are spread apart) and the diameter is decreased once the ends of the axle mounting plate are past the center of the axle, just as in the '393 patent.

3.

**\*28** Claims 16, 17, 22, 23, 25-27, 31, and 32 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Pierce US.

Claims 16, 17, 22, and 23 are rejected as unpatentable over Pierce US for the reasons stated with respect to claims 40, 41, 45, and 46, respectively. Also, claims 25, 26, 31, and 32 are rejected as unpatentable over Pierce US for the reasons stated with respect to claims 40, 41, 45, and 46, respectively.

Claim 27 is rejected as unpatentable over Pierce US for the reasons stated with respect to claim 18 in the original rejection.

### CONCLUSION

The rejections of claims 1-6, 8-15, 19-21, 24, 28-30, and 33 under 35 U.S.C. § 102(b) over Pierce PCT and Pierce US are affirmed.

The rejections of claims 16, 17, 22, 23, 25, 26, 31, 32, 34-41, and 43-48 under § 102(b) over Pierce PCT and Pierce US are reversed.

The rejections of claims 18 and 42 under § 103(a) over Pierce PCT and Pierce US are affirmed.

The rejections of claim 27 under § 103(a) over Pierce PCT and Pierce US are reversed.

New grounds of rejection are entered as to claims 16, 17, 22, 23, 25-27, 31, 32, 34-41, and 43-48 pursuant to 37 C.F.R. § 41.77(b). 37 C.F.R. § 41.77(b) provides that “[a]ny decision which includes a new ground of rejection pursuant to this

paragraph shall not be considered final for judicial review.”

[37 C.F.R. § 41.77\(b\)](#) also provides that the patent owner, within ONE MONTH from the date of the decision, must exercise one of the following two options with respect to the new ground of rejection to avoid termination of the appeal as to the rejected claims:

- (1) *Reopen prosecution*. The owner may file a response requesting reopening of prosecution before the examiner. Such a response must be either an amendment of the claims so rejected or new evidence relating to the claims so rejected or both.
- (2) *Request rehearing*. The owner may request that the proceeding be reheard under § 41.79 by the Board upon the same record. The request for rehearing must address any new ground of rejection and state with particularity the points believed to have been misapprehended or overlooked in entering the new ground of rejection and also state all other grounds upon which rehearing is sought.

The time period for response may not be extended.

AFFIRMED-IN-PART - [37 C.F.R. § 41.77\(b\)](#)

FN1. For simplicity, all cites are to Pierce PCT.

FN2. Although Pierce explains that the recess diameter can be equal to or slightly smaller than the axle diameter, the asserted advantages of the disclosed suspension system, addressed *infra*, appear to stem from having the recess diameter be smaller than the axle diameter.

FN3. Pages 2 and 3 are missing. Also, of the numerous figures mentioned in pages 4-6 (i.e., Figures A1-A6, B1-B11, C1-C23, and D1- D18), only Figures B-2 and C-3 were provided.

FN4. [Section 1.948](#) provides:

**[§ 1.948](#) Limitations on submission of prior art by third party requester following the order for inter partes reexamination.**

- (a) After the inter partes reexamination order, the third party requester may only cite additional prior art as defined under Sec. 1.501 if it is filed as part of a comments submission under [Sec. 1.947](#) or [Sec. 1.951\(b\)](#) and is limited to prior art:
    - (1) which is necessary to rebut a finding of fact by the examiner;
    - (2) which is necessary to rebut a response of the patent owner; or
    - (3) which for the first time became known or available to the third party requester after the filing of the request for inter partes reexamination proceeding. Prior art submitted under paragraph (a)(3) of this section must be accompanied by a statement as to when the prior art first became known or available to the third party requester and must include a discussion of the pertinency of each reference to the patentability of at least one claim. (b) [Reserved].
- [37 C.F.R. § 1.948 \(2003\)](#).

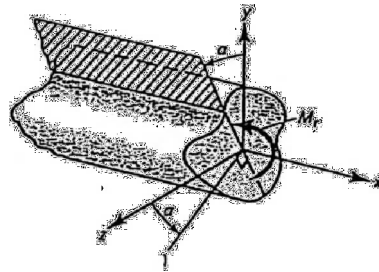
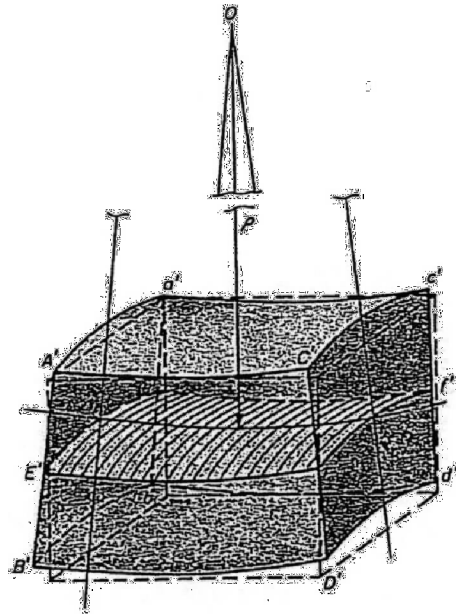
FN5. The “half wrap” is the axle connector (Pierce Aff. ¶ 8).

FN6. As already noted, Patent Owner does not challenge this or any other aspect of Mr. Pierce's testimony.

Attachment:

\*29 Edward F. Byars and Robert D. Snyder, *Engineering Mechanics of Deformable Bodies* 3, 25, 60-62 (Int'l Textbook Co. 1967)

## Engineering Mechanics



of Deformable Bodies

EDWARD F. BYARS

and

ROBERT D. SNYDER

*Department of Theoretical and Applied Mechanics West Virginia University*

**INTERNATIONAL TEXTBOOK COMPANY**

*Scranton, Pennsylvania*

Fifth Printing, June, 1967

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## Chapter 1

### Stress

#### 1-1. Introduction

The primary reason for the existence of an engineering material, member, or structure is to resist loads. Occasionally, other factors such as appearance are important. As far as this study of deformable bodies is concerned, however, the main function of an engineering member is to resist loads. Engineering mechanics of deformable bodies deals with the relationships between the loads applied to the bodies and the resulting internal effects and dimension changes of the bodies. In statics you studied forces, force systems, and equilibrium of force systems acting on bodies. But these bodies were considered to be *rigid*, and no consideration was given to dimension changes or to the intensities of internal forces in the bodies. In this course, internal-force intensities and dimension changes of *deformable* bodies will be studied in detail. Free-body analysis will remain of the utmost importance here, as in statics, because equilibrium equations must be used to relate the external forces to the internal forces. Generally, the internal-force intensities are known as stresses and the dimension changes are called deformations.

Before we derive the important relationships between loads and the resulting stresses and deformations, and before we show how they are applied in design, we want you to gain a thorough understanding of stress and deformation and to see how they are related to one another. Once these basic concepts are well understood, then you will be able to follow the derivations in Part III of this book in which stresses and deformations are related to loads.

#### 1-2. Normal Stress and Shear Stress

When a solid body is subjected to external forces, or loads, cohesive or adhesive forces will be produced inside the body. These internal forces are necessary to keep the body together. If the internal forces were not present, the body would be unable to keep its shape or support any external loads.

Consider the body A in Fig. 1-1(a). This body is being acted upon by a balanced system of external forces; that is, the body is in equilibrium

## Chapter 2

### Strain

#### 2-1. Deformations

As stated earlier, mechanics of deformable bodies concerns the relationships between external loads and the resulting internal force intensities and dimension changes. Chapter 1 dealt with the internal force intensities, which were defined as stresses. This chapter will be a similar treatment of dimension changes.

**\*30** The primary function of an engineering member is to resist loads. When loads of any type are applied to a member, the member will always undergo dimension changes. In other words, the loads alter the size and/or the shape of the body. Such dimension changes may or may not be visible to the naked eye depending on the degree to which the loads alter the body.

A dimension change is called a deformation and will be denoted by the letter  $e$ . A deformation which causes an increase of a length is commonly called an elongation, or extension; and a deformation which causes a decrease of a length will be called a contraction, or compression. A deformation which results in an angular distortion is called a shear deformation.

It is possible for an element in any solid body to undergo deformations of various types and in many directions when loads are applied. Hence, the general analysis of deformation is a three-dimensional problem. Although the discussions in this chapter will be confined to the deformations occurring in one plane, you should not lose sight of the fact that de-



formations may be occurring simultaneously in directions perpendicular to the plane under consideration.

## 2-2. Displacement

Let us begin our discussion by considering a solid body of arbitrary initial size and shape, as in Fig. 2-1 (a). At some point  $P$  on the surface of the body, we draw two very *short* intersecting lines  $PR$  and  $PS$ . Let us suppose now that the body is acted upon by some force system, as in Fig. 2-1(b), so that the body, and therefore every point in the body, is displaced to a new position; for example,  $P$  to  $P'$  and  $R$  to  $R'$ . (If the body were *rigid*, the points  $P$ ,  $R$ , and  $S$  would have retained their same relative positions in the body. The length  $P'R'$  would be the same as  $PR$ ,  $P'S'$  would be equal to  $PS$ , and the angle  $\angle P' R' S'$  would have the same magnitude as  $\angle P R S$ . Although

## Chapter 4

### Experimental Mechanical Properties of Engineering Materials

#### 4-1. Elastic and Plastic Deformations

Materials are classified or grouped in an almost limitless variety of ways. First of all, they are classified as solids, liquids, fluids, gases, vapors, etc. We will concern ourselves only with solids, although many of our definitions will apply to materials of the other types. Solid materials are further classified according to their molecular or crystalline structure, physical and chemical properties, thermal properties, electrical properties, mechanical properties, etc. In this chapter, we shall discuss some of the mechanical and thermal properties which are of particular importance to the engineer. For the most part, the mechanical properties will be those obtained experimentally from a *uniaxial* tension or compression test. A typical screw-type universal test machine commonly used for such uniaxial tensile or compressive tests is shown in Plate I. The machine as pictured is set up for a uniaxial tensile test.

**\*31** Before we discuss in detail specific experimental mechanical properties, it will be helpful to define some common general terms relating to material behavior. Several of these terms, such as elastic, plastic, stiffness, and brittle, are often used too loosely, incorrectly, and ambiguously.

**Elastic Action.** *Elastic* is an adjective meaning "capable of recovering size and shape after deformation." If a material is subjected to load, deformation will result. If, upon release of the load, the material returns to its original size and shape, it has undergone *elastic* action or *elastic* deformation. The stress was an *elastic* stress within the elastic range. *Elastic limit* is the maximum *uniaxial* stress that can be applied to a material without causing any permanent deformation. *Elastic range* is the range of stress below the elastic limit.

Nowhere in the discussion of the word elastic have we said or implied that the load and the deformation must be proportional or linearly related in the elastic range. They usually are, as we saw from the linear first portions of most stress-strain curves in Chapter 3, but linearity is not a necessary condition for a material to be elastic. Many engineering materials behave as indicated in Fig. 4-1(a); however, some behave as in (b) or (c) while in the elastic range. When a material behaves as in (c), the stress-strain relationship is *not* single valued, since the strain corresponding to any particular stress will depend on the loading history.

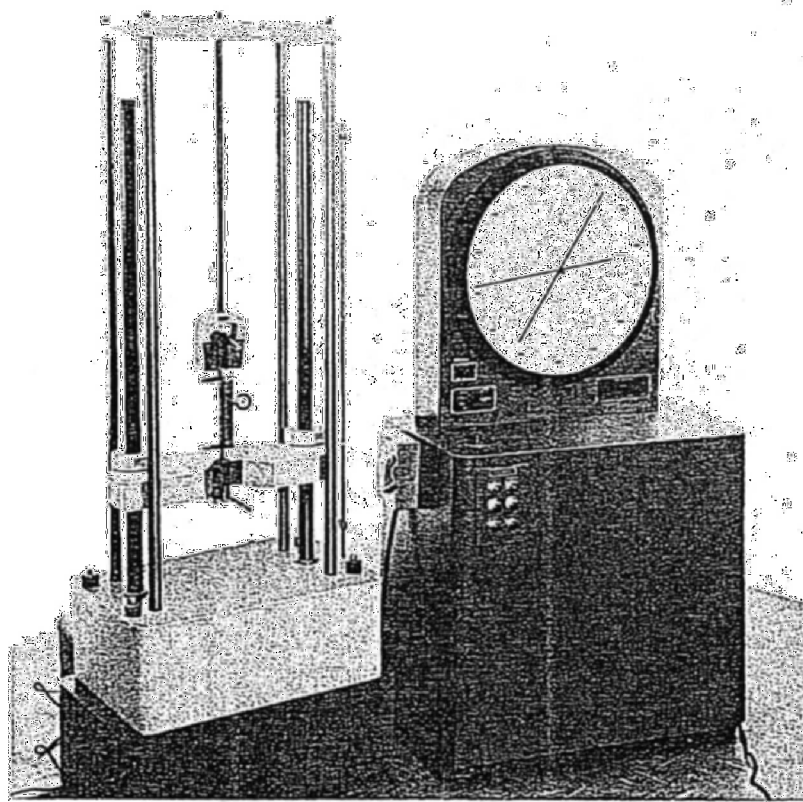


PLATE I. A typical screw-type universal test machine.

In engineering literature the term elastic action or elastic range is used quite commonly to mean a linear stress-strain behavior. It is common for an engineer to say elastic limit when he means proportional limit. This practice has come about naturally, because for most engineering materials the proportional-limit stress and the elastic-limit stress are approximately the same. It should be noted that, by definition, the proportional limit must be obtained from a load-deformation or stress-strain curve, but the elastic limit *cannot* be obtained from such a single curve. If desired, the elastic limit may be obtained from a laboratory test in which increasing loads are applied and released, and then a check for residual deformation is made. The value of the elastic limit determined experimentally in this way is dependent on the sensitivity of the measuring instrument used and on other variables such as time effect.

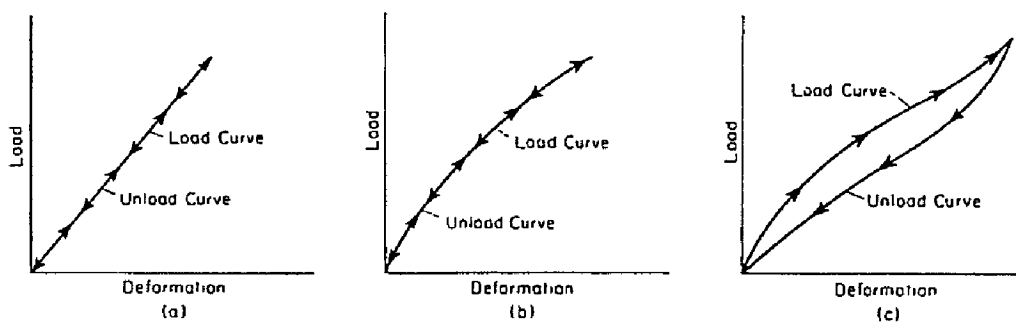


FIG. 4-1

**Plastic Action.** *Plastic* deformation, or *permanent set*, is any deformation that remains in the material *after* the load has been removed. All deformation is composed of plastic and elastic deformation. However, when the plastic deformation is negligible compared with the elastic deformation, the material is said to be elastic, and vice versa.

The average person often confuses brittleness with stiffness. Stiffness is the ability of a material to resist deformation. Thus, the modulus of elasticity and the tangent modulus are measures of stiffness. A material which undergoes very little plastic deformation before rupture is said to be *brittle*. A material which undergoes a great amount of plastic deformation before rupture is said to be *ductile*. Since elastic deformations are generally small, the usual measure of ductility (or brittleness) is the total percent elongation up to rupture of a 2-in. gage length tensile specimen. Sometimes the percent reduction of cross-sectional area of a tensile specimen after rupture is also used as a measure of ductility. A very ductile material such as structural steel, may have an elongation of 30 percent at rupture; whereas a brittle material, such as gray cast iron or glass, will have relatively little elongation at rupture. Compare the ductilities of several engineering materials in Table I of the Appendix. Figure 4-2 illustrates the difference in stress-strain curves for a ductile material and a brittle material.

#### 4-2. Ultimate Strength and Rupture Stress

**\*32** The ultimate tensile strength of a material is the *maximum* tensile stress the material can withstand before rupture in a tensile test in which the load is applied *slowly*. It is obtained by dividing the ultimate load by the original cross-sectional area of the test specimen (measured before loading). The ultimate tensile strength is the stress corresponding to the uppermost point on the stress-strain curve.

The ultimate compressive strength of a material is obtained in a similar manner from a compressive test. It is an important property for a brittle material. Many ductile materials do not exhibit a clearly defined rupture in a compression test. For such materials the load becomes indefi-

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2007 WL 988649 (Bd.Pat.App. & Interf.)

Page 1

2007 WL 988649 (Bd.Pat.App. & Interf.)

Board of Patent Appeals and Interferences  
Patent and Trademark Office (P.T.O.)

**\*1** ALFRED D.

**LOBO**

EX REL. LORD CORPORATION, REQUESTER/APPELLANT,

v.

UNITED STATES PATENT 6,399,670 (

**CONGOLEUM**

CORPORATION, PATENT OWNER/APPELLEE).

APPEAL 2007-0196

Reexamination Control No. 95/000,009

Entered: March 30, 2007

Heard: January 9, 2007

Alfred D. Lobo, Lobo & Co., LPA, of Cleveland, Ohio, for requester/appellant

Francis E. Morris, Morgan Lewis, of New York City, New York, and David R. Owens,  
Morgan Lewis, of Palo Alto, California, for patent owner/appellee

Before TORCZON, LANE, and TIERNEY

Administrative Patent Judges

TORCZON

Administrative Patent Judge

DECISION - Bd. R. 77(b)

INTRODUCTION

The invention disclosed in Congoleum Corporation's 6,399,670 patent is broadly directed to abrasion-resistant, textured coatings. The claims are broadly directed to a pre-cured coating mixture comprising a radiation-curable resin, an initiator, and a rheological control agent. The various claims add additional limitations or further limit the mixture or the rheological control agent.

Lord Corporation requested reexamination of all seventeen claims in Congoleum's patent as having been anticipated or obvious in view of prior art. The examiner granted the request for inter partes reexamination, but promptly declined to enter any rejection. An inter partes reexamination requester may appeal under [35 U.S.C.](#)

134 from a final decision of the examiner favorable to patentability. Such an appeal places the requester in the unaccustomed position of having both the burden of showing error in the examiner's decision and the ultimate burden of proof on the question of patentability.

We-

AFFIRM the decision not to reject the claims as anticipated;  
REVERSE the decision not to reject the claims as obvious; and  
REMAND for examination consistent with this opinion.

#### ANTICIPATION

Lord argues that the following patent anticipated Congoleum's claims under 35 U.S.C. 102:

H.A. Chen, R. Judd, I.B. Rufus, and J.R. Shultz, "Contrasting gloss surface coverings optionally containing dispersed wear-resistant particles and methods of making the same", U.S. Patent 6,228,463 B1 (issued 8 May 2001) ("Chen").

Lord is vague about which provision of § 102 applies.<sup>[FN1]</sup> The examiner characterizes the rejection as based on § 102(b). See, e.g., Action Closing Prosecution 4 (mailed 7 April 2003). Since the application that produced Congoleum's patent was filed before Chen issued, a rejection under § 102(b) is not possible. In failing to state a precise basis for the rejection, Lord arguably failed to make out a facially complete case in the first instance. The examiner should not be placed in the position of having to guess what the requester really meant before proceeding with the examination.

\*2 It is also improper for a requester to expect the Board to make out a facially adequate case on behalf of the requester for the first time on appeal. In this case, because we perceive no prejudice to Congoleum, the examiner, or the Board, we exercise our discretion to analyze the proposed rejection under § 102(e), which appears to be the most applicable basis for the rejection. On different facts, the requester's imprecision in proposing the rejection might have resulted in a simple affirmance instead.

Consideration of two limitations is sufficient to illustrate the substantive problems with the anticipation rejections.

#### *Sixty micron-sized nylon 12 particles*

Claim 1 requires 60 micron-sized nylon 12 particles. Lord points to Chen at 4:6-28,<sup>[FN2]</sup> which teaches wear-resistant particles, including hard plastics, and a most-preferred size range of 30-200 microns. While the claim limitation falls within Chen's teaching, both in terms of size and material, Chen does not expressly teach the limitation. We have no evidence that the limitation is inherent in Chen. If anything, the opposite is true since Chen (at 4:6-8) expressly prefers aluminum oxide particles. At the oral argument, Mr. Lobo, Lord's representative and a registered practitioner, was asked to explain how this limitation was met.

He could not do so yet he also declined the panel's invitation to withdraw the proposed anticipation rejection for claim 1. Lord's argument for the anticipation of claim 1 is frivolous.

An argument is frivolous when, among other possibilities, a reasonable patent practitioner would not believe the reference taught the contested limitation. *Cf. Antonious v. Spalding & Evenflo Companies, Inc.*, 275 F.3d 1066, 1074, 61 USPQ2d 1245, 1249 (Fed. Cir. 2002) (affirming frivolousness holding where accused device did not meet claim limitation literally or by the doctrine of equivalents). By maintaining a baseless assertion of anticipation without any plausible argument, Mr. Lobo exceeded the limits of acceptable advocacy. See 37 C.F.R. § 10.23(d) (reckless indifference may be construed as fraud).<sup>[FN3]</sup> Inter partes reexamination requesters and their proxies should not assume that they are impervious to procedural and substantive sanctions.

#### *Initiator*

Claim 6, like all of Congoleum's claims, requires an "initiator". The examiner contends that Chen fails to teach an initiator. The initiator in question facilitates the radiation-curing of the resin. See Congoleum's patent at 6:6-22, which explains that "Such initiators are well known in the art and may be selected based upon the curing conditions used (e.g., curing in an inert environment or in air)." Chen, however, does not expressly disclose the use of an initiator.

Lord has provided declaration testimony from Ian Quarmby. Dr. Quarmby is a Lord employee and purports to have considerable relevant experience in the ultraviolet ("UV") radiation-curable coatings art. Congoleum argues that the Quarmby declaration should be disregarded on many grounds. In particular, Congoleum "reserves its right to appeal" the petition decision permitting the declaration to remain in the record. Supp. Resp. Br. 1-2 (entered 7 July 2004). We give no weight to Congoleum's reservation. Review of a petition decision is beyond the purview of the Board on appeal. *Cf. In re Berger*, 279 F.3d 975, 984, 61 USPQ2d 1523, 1529 (Fed. Cir. 2002) (no review of petition in appeal proceeding). Congoleum's remedy was a mandamus action seeking review of the Director's discretionary decision. *Hornback v. United States*, 405 F.3d 999, 1000-01, 74 USPQ2d 1538, 1539 (Fed. Cir. 2005). The time for Congoleum to pursue its equitable remedy passed once the case was submitted to the Board. The declaration is in the record so we address it.

\*3 The examiner accords little weight to Dr. Quarmby's testimony because he is an employee of the requester. The relationship between a declarant and the proponent of the testimony is certainly a factor to be considered when assigning weight to the testimony. *E.g., Ferring B.V. v. Barr Labs. Inc.*, 437 F.3d 1181, 1188, 78 USPQ2d 1161, 1167 (Fed. Cir. 2006) (withheld relationship information was highly material); *Scripps Res. Inst. v. Genentech, Inc.*, 77 USPQ2d 1809, 1815 n.5 (BPAI 2005). There is no per se rule, however, that a relationship between the witness and proponent necessarily deprives the testimony of weight and credibility. While Dr. Quarmby's relationship with Lord gives rise to an inference that Dr. Quarmby



framed his testimony in a manner most favorable to Lord, it does not follow that his loyalty extends to dishonesty. Indeed, his declaration concludes with an acknowledgement of his obligation to tell the truth and of his criminal liability if he does not do so. Moreover, Dr. Quarmby's declaration is largely directed to statements of testable fact rather than opinion and includes data that tends to support the testimony.

Dr. Quarmby testifies, at ¶15, that commercial UV radiation-curable coatings like Chen's are formulated with a photoinitiator "because the resin without the photoinitiator would not cure with U-V radiation in a reasonable period, less than a day." We find this testimony to be very credible so far as it goes. Even if an initiator was recognized as desirable, we have no basis to infer that the resin Chen discloses necessarily had an initiator (or was otherwise fine-tuned for commercial use). The test for an inherent disclosure is fairly stringent. Given this stringency, we hesitate to fault the examiner for declining to find anticipation.

#### OBVIOUSNESS

Lord argues that the Chen patent with other prior art would have made Congoleum's claims obvious under 35 U.S.C. 103(a). We agree.

In general, the examiner has read both the claims and the teachings of the art too narrowly. During examination, claims are read as broadly as they reasonably can be read in view of the specification, while the prior art must be considered not only for what it teaches, but also for all that it would fairly suggest to a person having ordinary skill in the art. The examiner's narrow reading of the Chen patent, coupled with the perceived failure of the other prior art to remedy the deficiencies in Chen, led to reversible error on the question of obviousness.

#### "New" ground of rejection

All seventeen claims should be rejected as having been obvious as Lord proposed. Rather than repeat Lord's *prima facie* case for obviousness, we focus on a proper application of Chen to the contested limitations.<sup>[FN4]</sup> Once Chen is properly applied, Lord's proposed rejection speaks for itself.

#### An initiator

\*4 We start with the premise that Chen does not expressly or inherently teach the use of an initiator with Chen's invention. Would an initiator have been obvious to a person having ordinary skill in the art nevertheless? There is ample reason to believe it would have been.

As Lord points out in its request, Congoleum's patent discloses that initiators are "well-known". Indeed, Congoleum's patent broadly suggests that a person having ordinary skill in the art would know how to pick the initiator to suit the curing conditions. There is no argument that Congoleum's disclosure is not credible. The use of initiators in radiation curing cannot be well-known for the purpose of enabling Congoleum's claims, but not for the purpose of obviousness.

Alternatively, Dr. Quarmby credibly testifies that initiators are routinely part of preformulated, commercial UV-curable resins. Although this testimony might not be sufficient to establish inherency, it is more than adequate to make out a *prima facie* case that one skilled in the art would have used an initiator with Chen's composition if for no other reason than to comply with industry norms. *Cf. Richardson-Vicks Inc. v. Upjohn Co.*, 122 F.3d 1476, 1484, 44 USPQ2d 1181, 1187 (Fed. Cir. 1997) (noting that shifting industry norms and brand extension account for the claimed difference).

While the examiner was correct in not finding the initiator to be inherent in Chen, he erred in applying an inherency analysis to the obviousness rejection as well. There is enough in Chen alone, when viewed in light of either Congoleum's representations about the art in its patent disclosure or Dr. Quarmby's testimony, to make out a *prima facie* case that use of an initiator would have been obvious.

*A rheological control agent comprising alumina particles having an approximate size in the range from 27-56 nanometers*

The heading comes from Congoleum's claim 1. This discussion also applies to some of the other independent claims that are even less specific ("inorganic" for "alumina" in claims 6 and 10; "nanometer-sized" in claim 7). Lord cites Chen at 9:50-56:

Besides the above-described embodiments for incorporating wear-resistant particles into a coating layer, another method of incorporating wear-resistant particles into one or more coating layers involves the use of fumed silica or alumina or other similar types of materials as the suspension aid which have a submicron particle size range. Preferably, the submicron particle size range is from 5 to about 25 nm.

Chen expressly teaches alumina, which is undisputedly inorganic. Chen expressly prefers particles "about 25 nm". Two observations are apt. First, Chen's "about 25 nm" is fuzzy not just in the abstract, but also in comparison with the lower end of Chen's range (5 nm), which is not so qualified. Moreover, Chen's entire range is simply preferred. A person having ordinary skill in the art would not have read Chen as excluding 27 nm particles from the permissible range.

\*5 Congoleum expresses its lower bound as "an approximate size in the range of 27 ...nanometers". The lower bound of this claimed range is fuzzy. The imprecision in these proximate boundaries of Congoleum's claim and Chen's merely preferred range, is sufficient to make out a *prima facie* case for obviousness for this limitation.

*Sixty micron-sized nylon 12 particles*

Chen does not teach the use of 60 <mu>m nylon 12. Chen does teach, at 4:9-24, that suitable wear-resistant particles include aluminum oxide as well as:

"[o]ther wear-resistant particles includ[ing], but [] not limited to, carborundum, quartz, silica (sand), glass particles, glass beads, glass spheres (hollow and/or filled), plastic grits, silicon carbide, diamond dust (glass),

hard plastics, reinforced polymers, organics, and the like[.]” Moreover, the preferred “particle size of the wear-resistant particles is from about 10 microns to about 350 microns, and more preferably from about 20 microns to about 250 microns, and *most preferably from about 30 microns to 200 microns.*” (Emphasis added to stress the most preferred range since the examiner focused on the broadest range, thus needlessly making the choice seem less likely.) Chen then offers tests for those skilled in the art to determine whether the wear resistance is adequate. Finally, Chen notes that wear-resistant particles may protrude above the surface of the coating (i.e., provide texture) as a way of enhancing the wear resistance of the coating. Nylon 12 is a hard plastic and 60 <<mu>>m is within Chen's most preferred size range. Moreover, Chen suggests that those skilled in the art are comfortable with selecting an appropriate wear-resistance particle from the known choices and testing its performance using art-recognized tests.

“Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved.” *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). If after these determinations, the claimed invention appears to have been obvious, the burden of production (not the ultimate burden of proof) shifts to the patentee to provide so-called secondary considerations, i.e., contextual evidence, to show why in context the claimed invention is not as obvious as it first appears.

In this case, looking at the Chen content alone, the difference is clear: Congoleum claims a specific “texture-producing particle” within Chen's broad range of possible wear-resistant particles that provide texture. From Chen we know that those skilled in the art are sophisticated enough to choose from this selection with little guidance and to test their selections to ensure that they work. We have no indication that wear-resistant particle selection is unpredictable; indeed, Chen treats the alternatives as fungible. Given this fungibility, one of skill in the art might choose 60 <<mu>>m nylon 12 for just about any reason at all, including availability, cost, color choices, etc. In view of Chen alone, a person having ordinary skill in the art would have considered 60 <<mu>>m nylon 12 particles to have been an obvious choice.

*A coupling agent comprising prehydrolyzed silane*

\*6 This limitation comes from Congoleum's claim 1. No other independent claim requires any coupling agent. Claims 12 and 16 (depending from independent claims 10 and 14, respectively) require only a “coupling agent” with no further detail. Congoleum discusses the use of a coupling agent with the rheological control agent (“RCA”) in very broad terms, as though a person having ordinary skill in the art would already be familiar with the use of coupling agents in this context. For instance, in discussing the use of 27-56 nm alumina as the RCA (6:62-66), Congoleum notes in passing:

Most preferred is nanometer-sized alumina with a particle size range of 27-56 nm due to the enhanced cured coating transparency afforded by such small

particles when they are well-dispersed (e.g., through the use of an appropriate amount and type of coupling agent).

Similarly, in the next column (7:41-59), Congoleum leaves broad discretion to the reader to select an appropriate coupling agent:

A coupling agent or dispersing agent may also be added for purpose of aiding the dispersion of the RCA in the pre-cured coating mixture. The coupling agent may be any material that provides surfactant-like properties and is capable of enhancing the dispersion of the RCA in the pre-cured coating mixture, in particular, the dispersion of inorganic particles. The coupling agent ideally forms a chemical and/or physical bond with the pre-cured coating mixture and the inorganic particle, which improves the adhesion of the particle to the pre-cured coating mixture. Generally, the coupling agent is a organo-silicon or organo-fluorine containing molecule or polymer. Preferred organo-silicon materials are organosilanes and more preferably a prehydrolyzed organosilane. The coupling agent may also be vinyl phosphonic acid or mixtures of phosphonic acid with the prehydrolyzed organosilane. The concentration of the dispersing agent may be approximately 0.1-20%, by weight, in the pre-cured coating mixture, and more preferably approximately 0.1-15%, by weight.

As Lord notes, Chen discloses the effects of using a dispersing agent in a UV-cured system (Table 12, cols. 21 & 22). This is enough to reach the coupling agent limitation in all but claim 1. Claim 1, however, specifically requires "prehydrolyzed silane".

While Chen does not teach "prehydrolyzed silane" in so many words, Chen's more preferred suspension agent for alumina comprises "polysiloxane copolymer" (at 6:40-53; see also Table 12 at n.c where it is called a "dispersing agent"). According to Lord's request (at 17):

A polysiloxane copolymer is formed via hydrolysis of silanol monomers, and falls under the terminology "prehydrolyzed silane".

While this statement in isolation is attorney argument, it is pretty plausible on its face. Moreover, we need not read it in isolation. Lord cites two patents to Parker<sup>[FN5]</sup> illustrating this chemistry.

**\*7** The examiner dismisses the Parker patents as improper in an anticipation rejection. Had the examiner addressed them in the context of the obviousness rejection, he might have said they are not analogous art. Neither objection is apt in this case, however. The Parker patents are not used as prior art, but rather as an illustration of the chemistry underlying Congoleum's claim limitation: hydrolyzed silanes is broad enough to include siloxane oligomers. While it would have been neater for Lord to have used analogous art to help explain the claim term, there is no reason to believe the basic chemistry changes depending on who is using it.

Once Congoleum's claimed coupling-agent limitations are properly construed and the Chen reference is considered for all that it would have fairly taught a person having ordinary skill in the art, there is more than enough basis for a *prima*

*facie* case of obviousness for this limitation.

*Conclusion of obviousness*

The defects of the proposed anticipation rejection appear to have infected the obviousness analysis. If the claims are given their broadest reasonable scope and the references, particularly Chen, are read for all they fairly teach and suggest, Lord's proposed obviousness rejection makes sense on its face. Whether it will continue to make sense after Congoleum presents its case we need not prejudge.

FN1. When urging obviousness, on the other hand, Lord specifies that the statutory basis is [35 U.S.C. 103\(a\)](#), although in this case the precision is not as important.

FN2. Column:line(s).

FN3. Mr. Lobo's use of pejorative avian terms in referring to the examiner is also unprofessional. [37 C.F.R. §§ 1.3](#) (courtesy and decorum) and 41.1(c) (same).

FN4. The ultimate question of obviousness requires simultaneous consideration of all of the limitations and all of the teachings in the art. As a practical matter, we must look at the limitations individually and focus on the points actually in dispute.

FN5. A.A. Parker, T.T. Stanzione, G.H. Armstrong, F.E. Phelps, and S.M. Opalka, "Densified ceramic green sheet and stack having conductors therein", [U.S. Patent 5,252,655 \(issued 12 October 1993\)](#); A.A. Parker, E.M. Anderson, and T.T. Stanzione, "Surface treated ceramic powders", [U.S. Patent 5,348,760 \(issued 20 September 1994\)](#).

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2007 WL 952194 (Bd.Pat.App. & Interf.)

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

Board of Patent Appeals and Interferences  
Patent and Trademark Office (P.T.O.)

**NEC**

CORPORATION AND SUMITOMO CHEMICAL CO., LTD., (UNITED STATES PATENT 6,357,595),  
PATENT OWNERS-APPELLANTS,

v.

**ENTEGRIS**

, INC., THIRD-PARTY REQUESTER-RESPONDENT.

APPEAL 2006-3236

Inter Partes Reexamination Control No. 95/000,006 Technology Center 3900

Decided: March 26, 2007

Heard: January 9, 2007

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Before JOHN C. MARTIN, LEE E. BARRETT, and JAMESON LEE  
Administrative Patent Judges  
BARRETT  
Administrative Patent Judge

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. §§ 134(b) and 315(a) by the Patent Owners after a Right of Appeal Notice finally rejecting claims 1-11 and 16. Claims



12-15 have been canceled.

We affirm-in-part and enter new grounds of rejection.

#### INTER PARTES REEXAMINATION

A request was filed on December 4, 2002, by Third-Party Requester Entegris, Inc., Chaska, MN, for *inter partes* reexamination of U.S. Patent 6,357,595 (the '595 patent) issued March 19, 2002, to Shigeru Sembonmatsu and Manubu Ishikawa, based on Application 09/559,348, filed April 27, 2000, entitled "Tray for Semiconductor Integrated Circuit Device," assigned to real parties in interest NEC Corporation and Sumitomo Chemical Co., Ltd., both of Japan, which claims the foreign filing priority benefit of Japanese Application 11/124326, filed April 30, 1999.

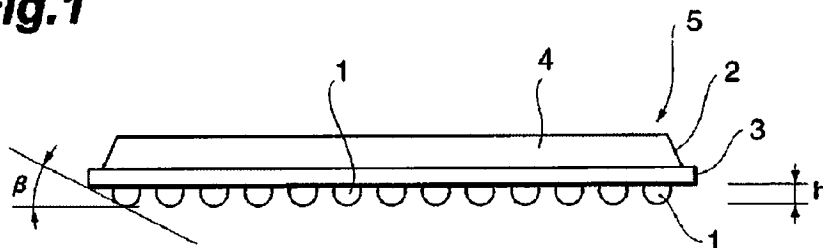
This *inter partes* reexamination was conducted under the regulations of 37 C.F.R. §§ 1.902-1.997 (effective Feb. 5, 2001), and 37 C.F.R. §§ 41.61-41.81 (effective September 13, 2004). The version of the regulations does not affect any issues in the appeal.

Both a patent owner and a third-party requester may appeal and a patent owner may be a party to any appeal taken by a third-party requester. 35 U.S.C. § 315. Thus, it is possible for the Requester, the Respondent here, to become the Appellant on appeal and for the Patent Owners, the Appellants here, to become Respondents or Cross-Appellants on appeal. To prevent confusion over the parties in any appeal from this decision, we refer in this opinion to the patent owners as the Patent Owners instead of Appellants and to the third-party requester as the Requester instead of the Respondent, except where "Appellants" and "Respondent" are used in the names of the briefs or are used in quotations.

#### BACKGROUND

\*2 The invention relates to a tray for storing a semiconductor integrated circuit device, such as an integrated circuit device in a ball grid array (BGA) package. Figure 1 of the '595 patent shows a side view of a BGA device.

**Fig.1**



A BGA device 5 is characterized by a thin planar housing and a plurality of external terminals 1 on the lower surface of the housing usually arranged in a two-dimensional array. Each external terminal is a small solder ball.

A BGA semiconductor device is stored in a storage portion of a tray to be transported or subjected to tests (Specification, col. 1, ll. 26-29). A storage portion of a conventional tray is a recess having almost the same shape as that of the package of the semiconductor device (*id.* at ll. 29-31). It is important that there not be any contact between the solder ball and the tray. The conventional tray supports the peripheral portion outside the outermost ball terminals of the lower surface of the package of the semiconductor device with a peripheral ledge of the storage portion of the tray, and restrains horizontal movement of the package with a wall surface of the storage portion (*id.* at ll. 31-43). As packages have become more and more compact, the width of the peripheral portion of the lower surface of the package has become narrower making it more difficult to avoid contact between the ball terminals and the tray (*id.* at ll. 44-51).

The '595 patent claims a tray having an inclined first wall surface for supporting the lower edges of the BGA semiconductor device package and a second wall surface for limiting horizontal movement of the BGA package.

**Fig.6**

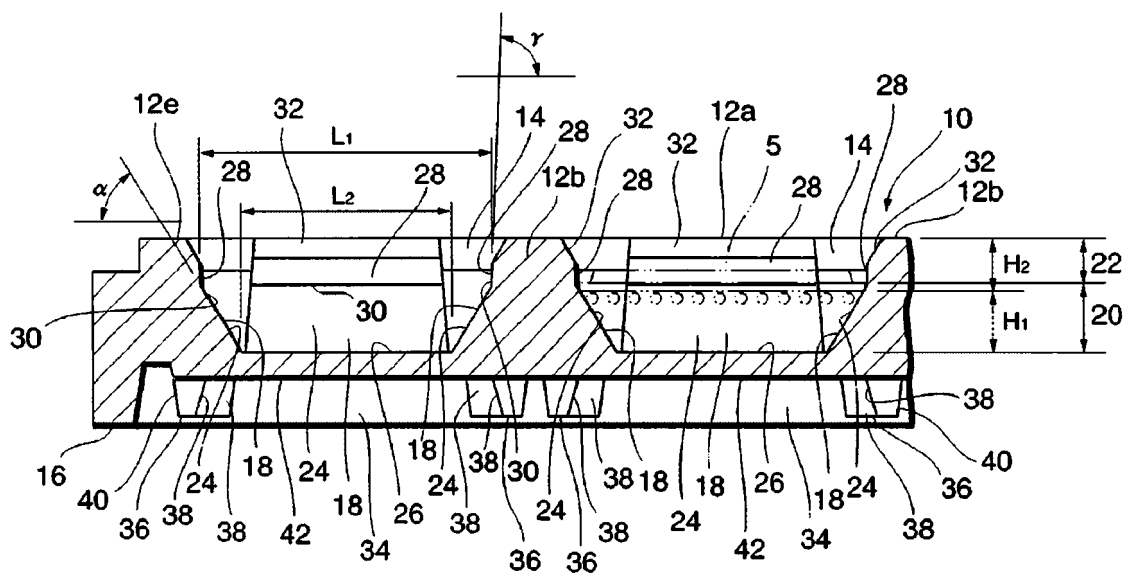


Figure 6 above is a sectional view of the tray. Each storage portion 14 has a first wall surface 24 which is inclined at an angle  $\alpha$  greater than the angle  $\beta$  formed between the lower edge of the package and the outermost ball terminals (Fig. 1) to support a peripheral edge of the BGA package 5 (shown in place on the right in chain lines) without contacting the ball terminals. A second wall surface 28 extends upwardly from an upper edge of the first wall surface and is inclined from the horizontal at an angle larger than the angle of the first wall surface to limit horizontal movement of the package.

Independent claim 1 is reproduced below (omissions from the original patent claim 1 are enclosed in brackets and additions are underlined, see 37 C.F.R. §§ 1.941 and 1.530(f)).

1. A tray for storing a semiconductor integrated circuit device having a package and wiring terminals on a lower surface of the package, said tray comprising:  
 a substantially planar main body; and  
 a first storage portion provided on a first surface of said main body for storing the semiconductor integrated circuit device, said first storage portion having a bottom surface and a first wall surface extending from said bottom surface and arranged around the semiconductor integrated circuit device when the semiconductor integrated device is stored in said first storage portion;  
 \*3 a second wall surface disposed around a circumference of the semiconductor integrated circuit device so as to limit horizontal movement of the semiconductor integrated circuit device, said first wall surface being inclined at an angle so as to support an edge of the package of the semiconductor integrated circuit device such that the wiring terminals of the semiconductor integrated circuit device do not contact said first wall surface when the semiconductor integrated circuit device is stored in said first storage portion, and said second wall surface extending [from said first wall surface in a direction away from said first wall surface of said main body] upward from an upper edge of said first wall surface, wherein said second wall surface is inclined at an angle larger than the angle of said first wall surface, with respect to the horizontal.

Proposed new claim 16 in the reexamination is reproduced below. Claim 16 is almost identical to claim 1 in the '595 patent except that the word "wall" is eliminated, as indicated in brackets. For clarity, claim 16 is not underlined as required for a proposed new reexamination claim.

16. A tray for storing a semiconductor integrated circuit device having a package and wiring terminals on a lower surface of the package, said tray comprising:  
 a substantially planar main body; and  
 a first storage portion provided on a first surface of said main body for storing the semiconductor integrated circuit device, said first storage portion having a bottom surface and a first wall surface extending from said bottom surface and arranged around the semiconductor integrated circuit device when the semiconductor integrated device is stored in said first storage portion;  
 a second wall surface disposed around a circumference of the semiconductor integrated circuit device so as to limit horizontal movement of the semiconductor integrated circuit device, said first wall surface being inclined at an angle so as to support an edge of the package of the semiconductor integrated circuit device such that the wiring terminals of the semiconductor integrated circuit device do not contact said first wall surface when the semiconductor integrated circuit device is stored in said first storage portion, and said second wall

surface extending from said first wall surface in a direction away from said first [wall] surface of said main body, wherein said second wall surface is inclined at an angle larger than the angle of said first wall surface, with respect to the horizontal.

#### THE REFERENCES

The Examiner relies on the following U.S. patent references:

Hutson	3,946,864	Mar. 30, 1976
Nemoto	5,551,572	Sep. 03, 1996
Brahmbhatt	5,791,486	Aug. 11, 1998
Murphy	5,848,703	Dec. 15, 1998
Narazaki	6,202,883	Mar. 20, 2001
		(filed Jan. 28, 1999)

#### THE REJECTIONS

\*4 Claims 1, 2, 5-11, and 16 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Brahmbhatt.

Claims 3 and 4 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hutson and Brahmbhatt.

Claims 3 and 4 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nemoto and Brahmbhatt.

Claims 3 and 4 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Murphy and Brahmbhatt.

Claims 3 and 4 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Narazaki and Brahmbhatt.

Claim 16 stands rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Patent Owners regards as the invention.

Claim 16 stands rejected under 35 U.S.C. § 305 [sic, § 314(a) for *inter partes* reexamination] as enlarging the scope of the claims of the '595 patent.

#### MAIN PAPERS IN REEXAMINATION

Date	
12/04/02	Request for <i>Inter Partes</i> Reexamination
02/06/03	Order Granting/Denying Request for <i>Inter Partes</i> Reexamination
02/06/03	Office Action in <i>Inter Partes</i> Reexamination
04/07/03	Response to Office Action in Reexamination
05/07/03	Comments of the 3rd Party Requestor on the First Office Action and Amendment
10/07/03	Action Closing Prosecution (37 CFR 1.949)
11/07/03	Response to Action Closing Prosecution (37 C.F.R. §

1.949)

12/10/03 Comments of the 3rd Party Requestor on the Action Closing Prosecution and Applicant's Response

03/02/04 Right of Appeal Notice (37 CFR 1.953)

05/28/04 Appellants' Brief on Appeal Under 37 C.F.R. § 1.965 (hereinafter "Patent Owner's Br.")

06/28/04 Respondent's Brief on Appeal Under 37 C.F.R. § 1.967 (hereinafter "Requester's Br.")

12/09/04 Examiner's Answer (hereinafter "Answer")

01/10/05 Appellants' Rebuttal Brief Under 37 C.F.R. § 41.69 [sic, § 41.71] (hereinafter "Patent Owner's Rebuttal Br.")

## DISCUSSION

### *The basis for the anticipation rejection of claim 1*

\*5 Requester proposed three rejections of independent claim 1: (1) claim 1 is anticipated under 35 U.S.C. § 102(b) by Figure 7 of Brahmhatt; (2) claim 1 is anticipated under § 102(b) by prior art Figure 17 of Brahmhatt; and (3) claim 1 is unpatentable for obviousness under § 103(a) over Brahmhatt. *See* Comments of the 3rd Party Requestor on the First Office Action and Amendment. The Examiner did not adopt proposed rejections (2) and (3). *See* Action Closing Prosecution 7 and 17-18. Requester argued that the two proposed rejections were proper. *See* Comments of the 3rd Party Requestor on the Action Closing Prosecution and Applicant's Response. The Examiner again did not adopt the proposed rejections. *See* Right of Appeal Notice 8 and 18-20.

Requester did not file a notice of appeal under 37 C.F.R. § 1.959(a)(2) from the Examiner's final determination not to make the proposed rejections, and did not file a notice of cross appeal under § 1.959(b)(2) from the Examiner's final determination not to make the proposed rejections in response to Appellant's Brief on Appeal. Instead, Requester filed Respondent's Brief on Appeal, and is a "Respondent" rather than a "Cross Appellant" under 37 C.F.R. § 1.962. Accordingly, only the anticipation rejection of claim 1 based on Figure 7 of Brahmhatt is on appeal.

### *Anticipation*

#### *Grouping of claims*

Patent Owners do not argue the separate patentability of dependent claims 2 and 5-11. Thus, the rejection of claims 2 and 5-11 stands or falls with the rejection of independent claim 1. *See* 37 C.F.R. § 41.67(c)(1)(vii). The rejection of independent claim 16 stands or falls by itself.

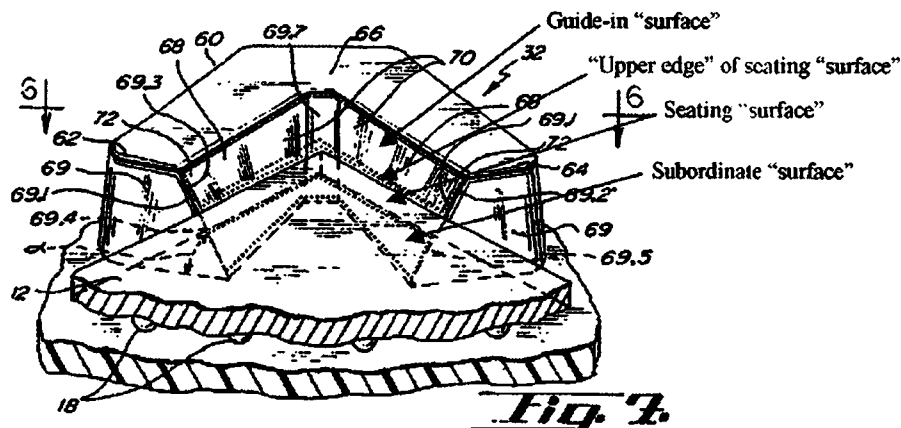
#### *The rejection*

The issues in the anticipation rejection of independent claim 1 involve the limitations of a "first wall surface" and a "second wall surface extending upward from an upper edge of said first wall surface." The issues in the anticipation rejection of independent claim 16 involve the limitations of a "first wall surface" and a "second wall surface extending from said first wall surface in a direction away from said first surface of said main body."

The Requester proposed the following reading of the "first wall surface," "second wall surface," and "upper edge of said first wall surface" in claim 1 onto Figure 7 of Brahmhatt:

The ordinary meaning of "surface" is merely "the outer face or exterior of an object." [*Webster's New World College*

*Dictionary* (3rd Edition, 1997).] Figure 7 of Brahmhatt [sic] '486, and the relevant portion of the specification thereof, depict and disclose inclined component contact portions 69.2, each having a guide-in portion 69.3, a seating portion 69.4, and a subordinate portion 69.5 below the seating portion. These three portions may be characterized as “surfaces”, since they are part of the exterior of the component support member. These surfaces may extend across inner face 68 to junction 66. As depicted below, the surfaces are vertically disposed relative to each other, and each has an “upper edge” which may be merely a line where one surface ends and another begins.



\*6 As illustrated, the guide-in surface extends upward from the upper edge of the seating surface. Also, a portion of the guide-in surface near portion 70 is at a greater angle relative to the horizontal than a portion of seating surface near portion 72. Thus, amended claim 1 still reads directly on at least the Figure 7 embodiment of Brahmhatt [sic] '486.

Comments of the 3rd Party Requestor on the First Office Action and Amendment at 3-4, section entitled “Amended Claim 1 is Anticipated Under 35 U.S.C. 102(b) by Figure 7 of the Brahmhatt [sic] '486 patent.”

The Examiner substantially adopted the Requester's proposed reasons for rejection (*see* Right of Appeal Notice 8) and stated (*id.* at 3):

The inner surface 68 may be considered to have relatively upper and lower adjacent surfaces commensurate with the levels of the guide-in portion 69.3, the seating portion 69.4. In addition, said upper and lower surfaces may themselves each be considered to include plural inclined surfaces since the angle of incline of the inner surface 68 gradually varies from a surface portion at 69.2, 72 to a location near to a surface portion 70 (close to face 69.7)....

Accordingly, the angle of incline of a relatively upper surface (i.e. a second wall surface) near the surface portion 70 will be greater than the angle of incline of a relatively lower adjacent surface (i.e. a first wall surface) of the surface portion 69.2, 72.

The Examiner used a dictionary to interpret an “edge” to be a “line where something begins or ends” (*id.* at 4) and stated (*id.*):

Reexamined claim 1 does not call for the first and second wall surfaces to have an abruptly changing transition boundary disposed between them. Accordingly, there are no limitations to prohibit the inner surface 68 of Brahmhatt from being interpreted in this rejection as including two (or even more) surfaces that are separated by lines of beginning and ending.

The Examiner further concluded (*id.*): “Finally, there is no requirement from the term ‘upper’ that the ‘upper edge’ be considered to have a horizontal orientation. For example the term ‘upper edge’ is broad enough to cover an edge that is slanted.”





### Analysis

*Issue (1): Does Brahmbhatt disclose a “second wall surface extending upward from an upper edge of said first wall surface, wherein said second wall surface is inclined at an angle larger than the angle of said first wall surface, with respect to the horizontal,” as recited in claim 1?*

### Arguments

Patent Owners argue that the Examiner improperly attempts to apply a single surface 68 of Brahmbhatt against the claimed first wall surface and second wall surface (Patent Owners' Br. 8). It is argued that Brahmbhatt does not disclose or suggest an “edge” between a first wall surface and a second wall surface, where the second wall surface extends upward from an “upper edge” of the first wall surface (*id.* at 9-10).

\*8 Requester states that Patent Owners' “first contention is that the Examiner's interpretation of the term ‘surface’ is unreasonable, apparently in that it enables regions of a surface not separated by an abrupt discontinuity to be themselves referred to as ‘surfaces’” (Requester's Brief 5). Requester submits that the Examiner's interpretation that “a surface may be considered to include plural surfaces even though there is not an abrupt change thereof” (Action Closing Prosecution 3) is reasonable and consistent with the '595 patent because the '595 patent uses the term “surface” to refer to different structures. For example: the entirety of each side of the tray having multiple distinct surface areas is a “surface” ('595 patent, col. 3, ll. 40-42); discrete sub-portions of each side are also referred to as a “surface,” e.g., a first wall surface 24 (*id.* at col. 4, ll. 27-30); a discontinuous group of selected separate surfaces is referred to as a single “surface,” e.g., the four inclined surfaces 24 around a package are claimed as a “first wall surface”; and sub-portions of a larger surface not interrupted by any discontinuity are referred to as “surfaces,” e.g., each bottom surface 42 of the lower side storage portion 34 on the bottom of the tray (Fig. 5) is part of a larger continuous lower planar surface. *See* Requester's Br. 5-7.

Requester notes that the Patent Owners complain that the Examiner's interpretation of the term “edge” as “a line where something begins or ends” is unreasonable (Requester's Br. 7): “Although never specifically articulated by Appellants as such, it appears that Appellants contend that ‘edge’ as it is used in the '595 patent, necessarily denotes a physical structure, and that therefore, the Examiner's construction, which includes a boundary between surfaces that may or may not be a physical structure, is too broad.” Requester states that the term “edge” is not expressly defined in the '595 patent, so it should be construed to include any and all dictionary definitions that are not inconsistent with the usage of the term in the claims and specification of the patent (*id.* at 8-9). Requester states that an “edge” can be defined as “a line where something begins or ends” or as “the boundary line of a surface or a region, a border; the region adjacent to this, a margin,” which definitions do not require a physical structure marking a boundary (*id.* at 9). For example, it is argued, the '595 patent discloses bottom surfaces 42 on the bottom surface of the tray, which are not delineated by any visible lines, but which must be demarcated by edges somehow to define where one bottom surface leaves off and the other begins (*id.* at 13).

\*9 Patent Owners do not respond to the Requester's arguments in their Rebuttal Brief. Patent Owners suggest that an edge between two surfaces requires a discontinuity; *see* Patent Owners' Rebuttal Br. 5 (“The Examiner asserts that he is interpreting the inner first face 68 of Brahmbhatt as comprising multiple surfaces, even though [sic] there is no discontinuity between such multiple surfaces.”). At the oral argument, counsel for Patent Owners stated that an “edge” requires a “visual” line. Patent Owners argue that it is impossible to determine from Brahmbhatt's written description where the Examiner's proposed first and second wall surfaces begin or end, and a skilled artisan would not be able to locate the alleged edge because an edge is not illustrated or described (Patent Owners' Rebuttal Br. 5-6).

The Examiner agrees with the Requester that it is consistent with the '595 patent “to broadly interpret a single surface as comprising multiple surfaces, even where there is no discontinuity between such multiple surfaces” (Answer 22). The

Examiner also agrees with the Requester that the '595 patent does not expressly define the term “edge,” that the dictionary definitions of an “edge” as a boundary do not require a structural mark, and that the definitions are not inconsistent with the use of the term “edge” in the '595 patent (Answer 24).

#### Analysis

The issue involves several subissues: (1) Does claim 1, interpreted in light of the '595 patent, require that the “edge” between the “first wall surface” and the “second wall surface” be a physical discontinuity?; (2) Does Brahmbhatt have a “first wall surface” and a “second wall surface”?; and (3) Does Brahmbhatt have a “second wall surface extending upward from an upper edge of said first wall surface”?

#### (1)

Patent Owners' arguments can be construed as saying that there must be some way to identify the “edge” where one surface stops and another surface starts, and that there is no way to identify the “edge” in Brahmbhatt because there is no discontinuity or other indicia of a line between the two surfaces alleged to correspond to the first and second wall surfaces. The '595 patent describes “the upper wall surfaces 28 sharply rising from the upper edges of the lower wall surfaces 24” (col. 5, ll. 17-18) and shows sharp distinct boundaries 30 at the intersection between the lower first wall surface 24 and the upper second wall surface 28 (Fig. 6). Nevertheless, this embodiment is nonlimiting and the '595 patent does not expressly define that a “surface” or an “edge” requires a discontinuity.

A “surface” is defined as “**1**: the exterior or outside of an object or body : the outermost or uppermost boundary : one or more of the faces of a three-dimensional thing : a plane of a solid <the uneven ~ of the earth> <on the ~ of the water> <planks with a rough ~> <the octagonal ~s of a diamond>.” *Webster's Third New International Dictionary (Unabridged)* (G.&C. Merriam Co. 1971). One relevant definition of a “face” is “[**6**] **f**: any one of the plane surfaces that bound a polyhedron (as a crystal) or other geometrical solid.” *Id.* Examiner and the Requester define an “edge” as “a line where something begins or ends” or as “the boundary line of a surface or a region, a border; the region adjacent to this, a margin,” and Patent Owners do not provide a counter-definition. According to these definitions, a “surface” can be one of the distinct planar faces on the tray defined by interruptions (such as a discontinuity where the surface stops or the line of intersection where two distinct surface areas meet), or the entire exterior of the tray (which is a collection of the individual faces), but this does not help answer the question of whether the single surface 68 in Brahmbhatt can have both a first wall surface and a second wall surface.

**\*10** Regardless of what definitions are used, there must be some objective way to identify a “surface” and an “edge” if the terms are to have any meaning. There are two interpretation clues in claim 1.

First, claim 1 defines the first and second wall surfaces in terms of their function. The function of the “first wall surface” is “to support an edge of the package of the semiconductor integrated circuit device,” and the function of the “second wall surface” is “to limit horizontal movement of the semiconductor integrated circuit device.” It is reasonable to interpret the extent of a wall surface to be defined by a physical interruption indicating the extent of the surface *or*, on a single surface, by where the surface ceases to perform its stated function. The boundary where a surface reaches a physical interruption *or*, on a single surface, where the surface ceases to perform its function is the “edge” of the surface. It does not make any difference whether the edge is a visible structural discontinuity or an imaginary line. As an example of defining separate surfaces on a single continuous surface by their function, the single continuous lower planar surface of the tray in the '595 patent is disclosed to have a bottom surface 42 for each of several lower side storage portions 34 (Figs. 5 and 6; col. 6, ll. 11-15) where the extent of each bottom surface 42 is defined by its function of it being a bottom. Different portions of a single uninterrupted surface can perform different functions and each portion can be considered a

different surface. Thus, it is possible for Brahmbhatt's surface 68 to have first and second wall surfaces, each defined by function.

Second, claim 1 recites that "said second wall surface is inclined at an angle larger than the angle of said first wall surface, with respect to the horizontal." This does not imply that either wall surface is flat or approximately flat. The claimed angle could refer to the average angle of its associated, possibly non-planar, surface area. It is possible that a part of the surface 68 in Brahmbhatt with a constantly varying angle could be a wall surface. Nevertheless, the requirement that the first and second wall surfaces have different angles implies the existence of an identifiable, physical transition between them, although it need not be abrupt. Thus, it is possible for Brahmbhatt's surface 68 to have first and second wall surfaces defined by the angle between the surface 68 and the horizontal base 20.

(2)

There is no dispute that the ridge 69.1 in Brahmbhatt, which may be slightly rounded (col. 5, ll. 39-40), corresponds to the claimed "first wall surface" because clearly it is inclined at an angle and supports an edge of the component 12. The most reasonable interpretation is that the first wall surface (ridge 69.1) extends the vertical length of the ridge 69.1, so the upper and lower edges of the first wall surface are defined by physical interruptions at the top and bottom of the ridge 69.1. The ridge 69.1 has one angle with respect to the horizontal. The edge between the first wall surface and the rest of surface 68 is just to the side of the ridge 69.1 where the ridge 69.1 ceases to perform the support function.

**\*11** The Examiner finds that the upper portion of the surface 68 near the vertical surface portion 70 corresponds to the "second wall surface." It is not clear where the edge of the second wall surface on surface 68 is located, because it is not clear where the portion of surface 68 would cease to perform the function of limiting horizontal movement (if, in fact, it performs this function). Since the "angle between the inner surface 68 and the base 20 progressively increases to substantially perpendicular as the junction 66 is approached" (Brahmbhatt, col. 5, ll. 46-48), a logical location for the edge is along the vertical line where the surface 70 meets the rest of surface 68. The vertical portion 70 of the surface 68 meets the limitation that "said second wall surface is inclined at an angle larger than the angle of said first wall surface, with respect to the horizontal." We assume that the upper portion of the surface 68 near the surface portion 70 in Brahmbhatt corresponds to the "second wall surface" for consideration of the next subissue, although we find in connection with Issue (3) that it does not perform the function of limiting horizontal movement.

(3)

We interpret the limitation of "said second wall surface extending upward from an upper edge of said first wall surface" in claim 1 to mean that the second wall surface is in contact with (it is "extending ... from") the upper edge of the first wall surface *and* that the second wall surface is at least partly directly above (it is "upward from") the upper edge of the first wall surface when the tray is horizontal. Assuming, *arguendo*, that the upper portion of surface 68 near surface 70 in Brahmbhatt corresponds to the second wall surface, this surface is not "extending upward from" an upper edge of the first wall surface because is laterally (horizontally) disposed with respect to the *side* edge of surface 69.1, and is not above the surface 69.1. Accordingly, Brahmbhatt does not disclose the structural relationship of "said second wall surface extending upward from an upper edge of said first wall surface." The anticipation rejection of claims 1, 2, and 5-11 is reversed.

There is no support for the "upper edge" locations proposed by the Requester and relied on by the Examiner. In the first annotated Figure 7 in the Comment of the 3rd Party Requestor on the First Office Action and Amendment, Requester shows the "upper edge" extending horizontally on a level with the upper edge of the seating surface. However, the proposed edge location does not represent a discontinuity between two surfaces *or* the boundary of a surface defined by its

function *or* the boundary between two surfaces as defined by a change in the angle between the two wall surfaces. The upper edge of the seating portion 69.4 in Brahmbhatt does not extend all the way across the surface 68 because the component 12 has point contact with the seating portion 69.4 (col. 5, ll. 34-37). Thus, one of ordinary skill in the art would not have been led to draw the “upper edge” as shown except by hindsight in view of the claim language. In the annotated Figure 7 in Respondent's Brief on Appeal, Requester shows the “edge” extending on a slant from the top of seating portion 69.4 to a lower corner of the surface 70 which is part of surface 68. Again, the proposed edge does not represent a discontinuity between two surfaces *or* the boundary of a surface defined by its function *or* the boundary between two surfaces as defined by a change in the angle between the two wall surfaces. The upper edge of the seating portion 69.4 does not extend all the way across the surface 68 as drawn. Again, one of ordinary skill in the art would not have been led to draw the “upper edge” as shown except by impermissible hindsight.

*\*12 Issue (2): Does Brahmbhatt disclose a “second wall surface extending from said first wall surface in a direction away from said first surface of said main body, wherein said second wall surface is inclined at an angle larger than the angle of said first wall surface, with respect to the horizontal,” as recited in claim 16?*

#### Arguments

Patent Owners argue that Brahmbhatt does not disclose the “second wall surface extending from the first wall surface in a direction away from said first surface of said main body” as recited in claim 16 because “[t]he single surface is not disclosed as being broken into a first wall surface and a second wall surface, nor does the single surface 68 disclose a second wall surface that extends from the first wall surface at an angle larger than the angle of the first wall surface [with respect to the horizontal]” (Patent Owners' Br. 13-14). It is argued that Brahmbhatt describes element 68 as a “first face” and element 69 as a “second face” which are separated by a ridge 69.1, which is evidence that one skilled in the art acknowledges the need for some demarcation between the two surfaces 68 and 69, but no such demarcation is found on the single surface 68 of Brahmbhatt (*id.* at 14).

Requester relies on the arguments for claim 1.

#### Analysis

Any prior art rejection of claim 16 is problematic because it is indefinite what is meant by “said second wall surface extending from said first wall surface in a direction away from said *first surface* of said main body” because the second wall surface is actually part of the first surface of the main body and, as claimed, extends away from itself, as discussed in the § 112, second paragraph, rejection. Nevertheless, it appears from Patent Owners' proposed amendment that what was intended was “said second wall surface extending from said first wall surface in a direction away from said *bottom surface*,” and the Examiner assumed for purposes of the anticipation rejection that this is what was intended (Right of Appeal Notice 7). We examine claim 16 with this interpretation rather than conclude that it is not definite enough to decide the issue of patentability. Cf. *In re Steele*, 305 F.2d 859, 862, 134 USPQ 292, 295 (CCPA 1962) (“[O]ur analysis of the claims leaves us in a quandary as to what is covered by them. We think the examiner and the board were wrong in relying on what at best are speculative assumptions as to the meaning of the claims and basing a rejection under 35 U.S.C. § 103 thereon.”).

Claim 16, as proposed to be amended, recites “said second wall surface extending from said first wall surface in a direction away from said bottom surface,” whereas claim 1 recites “said second wall surface extending upward from an upper edge of said first wall surface.” Although claim 16 does not recite an “upper edge,” there implicitly must be some way to distinguish the first and second wall surfaces. The limitation, “said second wall surface extending from said first wall surface,” impliedly requires that the second wall surface extends from an “edge” of the first wall surface. The limitation, “said second wall surface extending ... in a direction away from said bottom surface,” requires that the second wall surface is above at least part of the first wall surface and, hence, upward from an upper edge of the first wall surface. Thus,

claim 16, although differently worded, is essentially the same scope as claim 1 and the subject matter of claim 16, is not anticipated by Brahmbhatt for the reasons stated in the discussion of Issue (1). The anticipation rejection of claim 16 is reversed for this reason.

**\*13 Issue (3): Does Brahmbhatt disclose a “second wall surface ... to limit horizontal movement of the semiconductor or integrated circuit device”? (Claims 1 and 16.)**

#### *Arguments*

Patent Owners argue that Brahmbhatt does not disclose a “second wall surface disposed around a circumference of the semiconductor integrated circuit device so as to limit horizontal movement of the integrated circuit device” (Patent Owners' Br. 10). It is argued that the structure of Brahmbhatt will not physically permit contact between the surface portion 70 (which the Examiner finds to correspond to the “second wall surface”) and the component 12, as evidenced by Exhibit A to the brief (*id.* at 11-12). It is argued that the Examiner acknowledges that Brahmbhatt does not limit horizontal movement, but improperly attempts to make up for this deficiency by stating that the semiconductor device does not have to be rectangular (*id.* at 12). It is argued that the Examiner attempts to render the claimed second wall meaningless by alleging that the semiconductor device is an intended use, but the Examiner fails to recognize that intended use refers to statements in the preamble and the second wall surface is not in the preamble (*id.* at 12-13).

Requester argues that “[t]here are no limitations in the claim specifying the shape of the device, nor are there any limitations specifying the manner in which horizontal movement is to be limited or quantifying the amount of the limitation of movement” (Requester's Br. 15). “If the semiconductor device is dislodged upward from this ‘seated’ position, so long as it is below the top of the ‘corner guide 60’, its horizontal movement will be ‘limited,’ since it will eventually contact some portion of the ‘second wall surface’ as it moves horizontally in either direction.” (*Id.* at 16.)

Patent Owners do not respond to the Requester's arguments in their Rebuttal Brief. Patent Owners again argue that “it is improper for Examiner to add to the disclosure of Brahmbhatt by contending that ‘if’ a component 12 were designed in a particular way, its horizontal movement would be limited by the vertical portion 70” (Patent Owners' Rebuttal Br. 7) since Brahmbhatt does not disclose such a component.

The Examiner maintains the position in the Right of Appeal Notice that “[t]he second wall surface of Brahmbhatt is capable of functioning to limit horizontal movement of a semiconductor device of appropriate shape (as explained in the rejection) ...” (Answer 27).

#### *Analysis*

As a matter of claim interpretation, we conclude that the limitation of “a second wall surface disposed around a circumference of the semiconductor integrated circuit device so as to limit horizontal movement of the semiconductor integrated circuit device” does not define how much or under what conditions the second wall surface limits horizontal movement. The limitation can be interpreted to mean that the second wall surface prevents any horizontal movement of the integrated circuit device from its seated position, or that it limits horizontal movement when the circuit device is displaced (slightly or a great deal) from its seated position.

**\*14** The portion 70 of the surface 68 adjacent the junction 66 and the corner face 69.7 are both substantially vertical surfaces, perpendicular to the base 20, and extend above the top of the component 12 when it is seated. The tip 19.1 of the corner 19 of the component 12 is slightly separated from the face 69.7 of the junction 66 when the component is in the seated position (Fig. 5; col. 5, ll. 61-65). Brahmbhatt does not describe any function for the portions 70 and face 69.7; thus, any rejection must rely on inherency. “Inherency ... may not be established by probabilities or possibilities.” *In re Oelrich*, 666 F.2d 578, 581, 212 USPQ 323, 326 (CCPA 1981).



If the component 12 is displaced laterally from its seated position, the component 12 will ride up the ridges 69.1 and will never hit the surfaces 70. If the component 12 is displaced diagonally from its seated position, it appears that the tip 19.1 of the component 12 will hit the face 69.7 and not the surfaces 70. The face 69.7 cannot be the “second wall surface” because it is not “extending ... from” the first wall surface. If the component 12 is twisted, it is not certain whether it is capable of touching surface 70. Requester's argument that the component can touch the walls is unpersuasive because it requires reading too much into the drawings. See *In re Wright*, 569 F.2d 1124, 1127, 193 USPQ 332, 335 (CCPA 1977) (“Absent any written description in the specification of quantitative values, arguments based on measurement of a drawing are of little value.”). The mere fact that the surfaces 70 extend above the top of the component 12 does not necessary imply that they will operate to limit horizontal movement. It is our responsibility to resolve disputed facts, and we find that the evidence does not show that Figure 7 of Brahmbhatt discloses a “second wall surface ... to limit horizontal movement of the semiconductor integrated circuit device.”

The Examiner also found that the surfaces 70 do not limit horizontal movement of the rectangular device shown in Brahmbhatt, but found that Brahmbhatt would limit horizontal movement of an “appropriately shaped” device. We disagree with the Examiner's reasoning about an “appropriately shaped” device. The Examiner does not explain what kind of device would be “appropriately shaped,” but the term implies a device that is designed to be limited in horizontal movement by the structure in Figure 7. The rejection is based on anticipation, not obviousness. Inherency cannot be based on speculation or possibilities. See *Oelrich*, 666 F.2d at 581, 212 USPQ at 326.

For the reasons stated above, we find that the evidence is insufficient to establish that Figure 7 of Brahmbhatt discloses a “second wall surface ... to limit horizontal movement of the semiconductor integrated circuit device,” as recited in claims 1 and 16. The anticipation rejection of claims 1, 2, 5-11, and 16 is also reversed because of this limitation.

#### *Obviousness*

\*15 Hutson, Nemoto, Murphy, and Narazaki are applied to the rejection of dependent claims 3 and 4 for their teachings of ridges. We have considered the teachings of the references, but find that they do not cure the deficiencies of Brahmbhatt with respect to the rejection of independent claim 1. Accordingly, the obviousness rejections of claims 3 and 4 over Brahmbhatt and one of Hutson, Nemoto, Murphy, or Narazaki are reversed.

#### *35 U.S.C. § 314(a)*

#### *Rejection and arguments*

New claim 16 added during the reexamination proceeding is almost identical to claim 1 in the '595 patent except that the word “wall” is eliminated as indicated in brackets in the limitation “said second wall surface extending from said first wall surface in a direction away from said first [wall] surface of said main body.” The Examiner rejects claim 16 under 35 U.S.C. § 305 (this should be § 314(a) for an *inter partes* reexamination) as being impermissibly broader than the original claims of the '595 patent because “away from said first surface of said main body” in claim 16 does not have the same meaning as “away from a first wall surface of said main body” as in original claim 1. Right of Appeal Notice 17-18.

Patent Owners argue that the test for broadening is not whether the claim has the same meaning. It is argued that claim 16 contains all the features of issued claim 1, with a mere rephrasing of terminology (Patent Owners' Br. 21):

In particular, this rejection is improper because claim 16 describes the second wall surface as extending from the first wall surface. One skilled in the art would acknowledge that a second wall surface extending from a first wall surface means that the second wall surface extends away from the first wall surface. The fact that claim 16 also describes the second wall surface as extending in a direction away from the bottom surface of the first storage portion

does not result in claim 16 being broader than claim 1.

We note that claim 16 does not recite extending from a “bottom surface.”

Requester responds that claim 16 is broader than claim 1 in that it no longer requires the “second wall surface” to extend “in a direction away from said first wall surface” (Requester's Br. 21). It is argued that Patent Owners' argument that the claims have the same meaning contradicts the claim construction axiom that each claim element is material (*id.*).

Patent Owners argue that a “second wall surface that extends ‘from’ a first wall surface inherently means that the second wall surface extends ‘away’ from the first wall surface and therefore the features of claim 16 would not be afforded a broader scope than those of claim 1 in the reexamined patent” (Patent Owners' Rebuttal Br. 9).

**\*16** The Examiner's Answer maintains the rejection.

#### Analysis

In an *inter partes* reexamination, “no proposed amended or new claim enlarging the scope of the claims of the patent shall be permitted.” 35 U.S.C. § 314(a). A claim is broader in scope if it includes within its scope any subject matter that would not have infringed the original patent. See *In re Freeman*, 30 F.3d 1459, 1464, 31 USPQ2d 1444, 1447 (Fed. Cir. 1994). Eliminating a claim limitation usually constitutes a prima facie broadening because a claim with fewer limitations is normally broader. However, the claim language must always be analyzed case-by-case.

Original claim 1 in the '595 patent recites “a first surface of said main body,” “a first wall surface,” and “said second wall extending away from said first wall surface in a direction away from said first wall surface of said main body”:

1. A tray for storing a semiconductor integrated circuit device having a package and wiring terminals on a lower surface of the package, said tray comprising:
  - a substantially planar main body; and
  - a first storage portion provided on a *first surface of said main body* for storing the semiconductor integrated circuit device, said first storage portion having a bottom surface and a *first wall surface* extending from said bottom surface and arranged around the semiconductor integrated circuit device when the semiconductor integrated device is stored in said first storage portion;
  - a second wall surface disposed around a circumference of the semiconductor integrated circuit device so as to limit horizontal movement of the semiconductor integrated circuit device, said first wall surface being inclined at an angle so as to support an edge of the package of the semiconductor integrated circuit device such that the wiring terminals of the semiconductor integrated circuit device do not contact said first wall surface when the semiconductor integrated circuit device is stored in said first storage portion, and *said second wall surface extending from said first wall surface in a direction away from said first wall surface of said main body*, wherein said second wall surface is inclined at an angle larger than the angle of said first wall surface, with respect to the horizontal.

There is no clear antecedent basis for “said first wall surface of said main body.” Instead, the phrase refers to and combines two different antecedents: “a first surface of said main body” and “a first wall surface.” The claim is ambiguous in this respect, which is the most likely reason that claim 16 was added with the word “wall” omitted (Patent Owners do not explain why claim 16 was added). The most reasonable construction is that “said first wall surface of said main body” should be understood to mean “said first surface of said main body,” as now recited in claim 16. Therefore, claim 16 is not broader in this respect than original patent claim 1.<sup>[FN1]</sup>

**\*17** Assuming that “said first wall surface of said main body” refers to the “first wall surface” instead of “said first surface of said main body,” claim 16 is still not broader than original claim 1. In the limitation, “said second wall surface extending from said first wall surface in a direction away from said first wall surface of said main body,” in original

claim 1, we interpret “said second wall surface extending from said first wall surface” to mean the same thing as “said second wall surface extending ... in a direction away from said first wall surface of said main body” for the reason stated by Patent Owners, i.e., a “second wall surface that extends ‘from’ a first wall surface inherently means that the second wall surface extends ‘away’ from the first wall surface” (Patent Owners’ Rebuttal Br. 9). Therefore, the limitation “extending ... in a direction away from said first wall surface of said main body” could be deleted as redundant without broadening the claim. Because the limitation has been changed to “extending ... in a direction away from said first surface of said main body,” this adds a limitation that the second wall surface extends “from” both the “first wall surface” and the “first surface,” which narrows the scope of original patent claim 1.

We conclude that claim 16 is not broader than original claim 1 in the ‘595 patent. The rejection under 35 U.S.C. § 314(a) is reversed.

*35 U.S.C. § 112, second paragraph*

*Rejection and arguments*

The Examiner rejected claim 16 under 35 U.S.C. § 112, second paragraph, as being indefinite, stating that “it is unclear what surface is being relied on to be the first surface of the main body.” Action Closing Prosecution 15. The Examiner noted that the ‘595 patent describes an “upper surface of the tray” (col. 3, ll. 41-42) and an “upper surface of the tray main body” (col. 3, ll. 60-61), but concluded “that such descriptions are insufficient, with respect to indicating the location of the first/upper surface of the main body, to support using the first surface of the main body as a reasonable basis for which to claim the relative location of the second wall surface in the reexamined claim 16” (Action Closing Prosecution 16).

Patent Owners proposed an amendment to claim 16 to: (1) delete the recitation of “a first surface of” in the limitation “a first storage portion provided on a first surface of said main body”; and (2) to change “said second wall surface extending from said first wall surface in a direction away from said first surface of said main body” to “said second wall surface extending from said first wall surface in a direction away from said bottom surface of said first storage portion.” Response to Action Closing Prosecution 2 and 12-13. The Examiner denied entry of the amendment. Right of Appeal Notice 2.

NOTE: in Patent Owners’ Brief in eDAN<sup>[FN2]</sup>, a handwritten notation “incorrect” appears next to the statement that “an amendment to claim 16 was filed, but not entered,” and the amendment to claim 16 appears to have been entered as indicated by the handwritten notation “B1” in the Response to Action Closing Prosecution 2. We assume that the amendment has *not* been entered.

\*18 Patent Owners argue that claim 16 recites a planar body and a first storage portion provided on a first surface of the main body, that the planar main body is disclosed in the detailed description and represented with a reference numeral, and that “[o]ne skilled in the art would be apprised of the scope of claim 16 because that person would realize that a planar main body includes a surface” (Patent Owners’ Br. 20).

Requester responds (Requester’s Br. 20):

Indeed, the detailed description of the ‘595 patent discloses that the “tray main body 11” has an “upper surface.” See ‘595 patent, col. 3, ll. 59-61. This, however, cannot be the “first surface of said main body” from which the “second wall surface” extends in a “direction away”, because the “second wall surface” is a part of the “upper surface” of the tray. If the “upper surface” of the tray were the “first surface of said main body”, the claim would nonsensically call for the “second wall surface” to extend in a direction away from itself. Clearly, Appellants argument does nothing to dispel the ambiguity and vagueness of the language referenced in the rejection.

Patent Owners essentially repeat the arguments from the brief (Patent Owners’ Rebuttal Br. 8), without addressing Re-

quester's arguments.

The Examiner agrees with the Requester's reasons why it is unclear what surface is referred to by the limitation (Answer 35).

#### *Analysis*

As discussed in the rejection under [35 U.S.C. § 314\(a\)](#), there was no clear antecedent basis for “said first *wall* surface of said main body” in original patent claim 1. Claim 16 was apparently added to delete the word “wall” to correct the antecedent basis problem. However, it is now indefinite what is meant by “said second wall surface extending ... in a direction away from said first surface of said main body.”

The '595 patent discloses that in “the ordinary use state of the tray 10, i.e., a state wherein the tray 10 is set horizontally, ... the surface which can be seen will be referred to as the upper surface of the tray 10, and that the surface which cannot be seen will be referred to as the lower surface of the tray 10” (col. 3, ll. 38-43) and that “[t]he tray 10 shown in FIG. 3 comprises a substantially rectangular and planar main body 11” (col. 3, ll. 58-59) having a “plurality of linear ridges 12 formed on the upper surface of the tray main body 11” (col. 3, ll. 60-61) to form storage portions 14. The tray 10 is “planar” because the tray is relatively thin compared to its width and length, not because it is perfectly flat and smooth. In the limitations, “a substantially planar main body; and a first storage portion provided on a first surface of said main body” in claim 16, we interpret the “first surface of said main body” to refer to the upper surface of tray 10 as seen in Figure 3, which contains many discrete surfaces, including, for example, the claimed “bottom surface,” “first wall surface,” and “second wall surface.” Because the “second wall surface” is one of the many distinct surfaces which makes up the “first surface,” the limitation of “said second wall surface extending ... in a direction away from said first surface of said main body” is indefinite because it confusingly implies that the “second wall surface” extends away from itself. The rejection of claim 16 is sustained.

**\*19** Although we think that Patent Owners meant to claim “said second wall surface extending ... in a direction away from said *bottom* surface,” as evidenced by the proposed amendment, claim 16 is indefinite as it stands. “[D]uring patent prosecution when claims can be amended, ambiguities should be recognized, scope and breadth of language explored, and clarification imposed. ... An essential purpose of patent examination is to fashion claims that are precise, clear, correct, and unambiguous. Only in this way can uncertainties of claim scope be removed, as much as possible, during the administrative process.” *In re Zletz*, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989). Patent Owners' proposed amendment would overcome the indefiniteness rejection.

#### NEW GROUNDS OF REJECTION UNDER [37 C.F.R. § 41.77\(b\)](#)

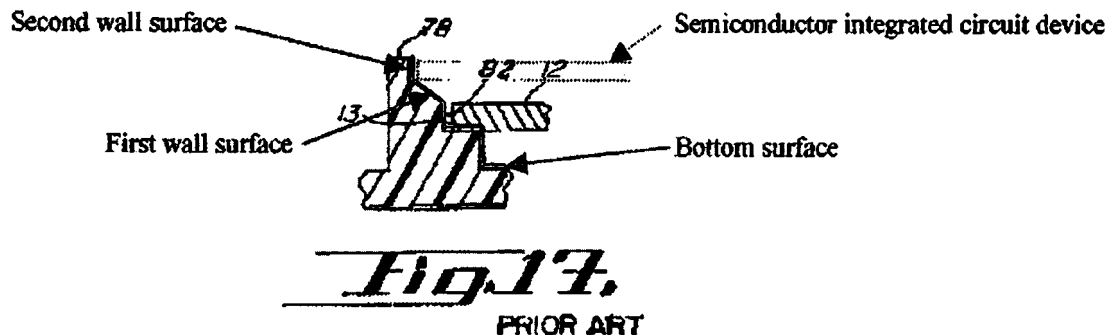
Claims 1, 2, 9-11, and 16 are rejected under [35 U.S.C. § 102\(b\)](#) as being anticipated by Brahmbhatt

Claims 1, 2, 5-11, and 16 are rejected under [35 U.S.C. § 103\(a\)](#) as being unpatentable over Brahmbhatt

Claims 3 and 4 are rejected under [35 U.S.C. § 103\(a\)](#) as being unpatentable over Brahmbhatt and Murphy.

#### *Anticipation*

This anticipation rejection is based on a proposed anticipation rejection of claim 1 by the Requester, and is extended to claims 2, 9-11, and 16. Requester found that the prior art pocket of Figure 17 of Brahmbhatt anticipates the structure of claim 1 because it is *capable* of storing a semiconductor integrated circuit device as shown in Figure 17, reproduced below from the Comments of the 3rd Party Requestor on the First Office Action and Amendment 6. The Examiner did not adopt the rejection, so it has never been argued against by the Patent Owners.



The above Figure 17 is annotated by Requester to show an integrated circuit device in dotted lines sitting on the inclined guide-in surface of a prior art wall structure to illustrate that a device is capable of sitting on the inclined surface. The inclined surface is labeled a “first wall surface,” the vertical surface above the inclined surface is labeled a “second wall surface,” and the lower horizontal surface and surfaces leading to the lower edge of the first wall surface are labeled a “bottom surface.”

The preambles of claims 1 and 16 recite a “tray for storing a semiconductor integrated circuit device” and the bodies of the claims recite how the device is intended to fit into the tray. The “semiconductor integrated circuit device” is not part of the claimed tray, but is an “intended use” for the tray. That is, the claims are directed to a tray, not the tray in combination with the semiconductor device.

\*20 The “intended use” of a machine is not germane to the issue of patentability of the machine itself. *In re Casey*, 370 F.2d 576, 580, 152 USPQ 235, 238 (CCPA 1967). A statement of intended use does not qualify or distinguish the structural apparatus claimed over the reference. *In re Sinex*, 309 F.2d 488, 492, 135 USPQ 302, 305 (CCPA 1962). There is an extensive body of precedent on the question of whether a statement in a claim of purpose or intended use constitutes a limitation for purposes of patentability. See generally *Kropa v. Robie*, 187 F.2d 150, 155-59, 88 USPQ 478, 483-87 (CCPA 1951) and the authority cited therein, and cases compiled in 2 Chisum, *Patents* § 8.06[1][d] (2006). Such statements often, although not necessarily, appear in the claims preamble. *In re Stencel*, 828 F.2d 751, 754, 4 USPQ2d 1071, 1073 (Fed. Cir. 1987). However, the structure must be capable of performing the intended use.

The issue is whether Brahmbhatt's structure in Figure 17 is capable of performing the “intended use” of storing a semiconductor integrated circuit device as claimed.

The inclined surface leading into the pocket in Figure 17 corresponds to a “first wall surface” and is *capable of* supporting an edge of the package of an integrated circuit device. Of course, the surface is not capable of supporting the edge of a package unless a package exists that is larger than the package 12 shown in Figure 17. We take Official Notice of the facts that integrated circuit packages come in different sizes and that trays are designed for a certain package size.<sup>[FN3]</sup> The tray in Figure 17 can be for a small package, where the inclined surface is capable of supporting a larger package. Brahmbhatt expressly describes the use of an inclined surface to support the edge of a package.

The vertical wall surface above the upper edge of the inclined wall guide-in surface corresponds to a “second wall surface” and is *capable of* limiting the horizontal movement of the device in the same way as the surface 28 in the '595 patent. As discussed in Issue (3), the limitation of “a second wall surface disposed around a circumference of the semiconductor integrated circuit device so as to limit horizontal movement of the semiconductor integrated circuit device” does not define how much, or under what conditions the second wall surface limits horizontal movement.

The term “surface” has a broad meaning in the '595 patent and may include several distinct surfaces, e.g., the “upper surface” of the tray ('595 patent, col. 3, ll. 36-43) includes all the surfaces of the storage portions on the top of the tray, including the claimed “bottom surface,” “first wall surface,” and “second wall surface.” Accordingly, the claimed “bottom” surface may be considered to include and extend from the bottommost horizontal surface to the lower edge of the inclined surface as shown in the Requester's figure.

\*21 Brahmhatt's structure is capable of storing a semiconductor integrated circuit device as claimed. Claims 1 and 16 are anticipated.

Brahmbhatt recognizes that the surface of the tray should not come into contact with the solder balls of the integrated circuit package (col. 1, ll. 55-65). Therefore, the inclined guide-in surface in Figure 17 leading to the seating surface would necessarily be angled to prevent the surface from coming into contact with the ball terminals as the package is being inserted and would not contact the ball terminals of a package sitting on the inclined surface as recited in claim 2. The angles of the inclined surface and the vertical surface in Figure 17 anticipate the limitations of claims 9-11.

Although Brahmhatt discloses second storage portions on a surface opposite to the first surface, as recited in claims 5-8, this is not expressly shown in Figure 17. Therefore, claims 5-8 are not rejected as anticipated.

We briefly comment on why the Examiner did not adopt the Requester's proposed anticipation rejection. The Examiner found that the vertical wall surface, which the Requester found to correspond to the “second wall surface,” was not “inclined ... with respect to the horizontal.” See Action Closing Prosecution 7. This is wrong because a vertical surface is inclined at an angle of 90° with respect to the horizontal. A vertical surface is not inclined with respect to a *vertical* surface. Thus, the Examiner's rationale is not persuasive.

#### *Obviousness*

##### *Brahmbhatt - claims 1, 2, 5-11, and 16*

Claims 1, 2, 9-11, and 16 are unpatentable for obviousness for the reasons stated in the anticipation rejection because anticipation is the epitome of obviousness. See *In re Paulsen*, 30 F.3d 1475, 1481, 31 USPQ2d 1671, 1675 (Fed. Cir. 1994). Claims 1, 2, 5-11, and 16 are also unpatentable for obviousness for the following additional reasons.

Brahmbhatt discloses a semiconductor tray having inclined wall surfaces to support an integrated circuit package along its lower peripheral edges to prevent contact between the tray and the solder ball terminals and also to center the package within the pocket. For this reason, Patent Owners canceled claims 12-15 of the '595 patent, which do not recite a second wall surface extending upward from the upper edge of the first wall surface. The claims on appeal recite a second wall surface for limiting horizontal movement which extends upward from the inclined first wall surface.

The obviousness issue can be approached in two different ways.

#### (1)

First, consider that Figure 17 of Brahmhatt teaches a second wall surface for limiting horizontal movement of a component, but does not teach an inclined first wall surface for supporting a component edge.

Figure 17 of Brahmhatt discloses a prior art pocket structure having a vertical surface leading to an angled guide-in surface which extends to a vertical surface 82 (“second wall surface”) which constrains the side surface 13 of the component 12. See col. 6, ll. 35-38. A horizontal ledge (“first wall surface”) supports the peripheral bottom surface of the component package. The difference between Figure 17 and the subject matter of claims 1 and 16 is that Figure 17 does not have



“said first wall surface being inclined at an angle so as to support an edge of the package of the semiconductor integrated circuit device.”

**\*22** A rejection must articulate the reasons why one of ordinary skill in the art would have been motivated to select the references and to combine or modify them to render the claimed invention obvious. *In re Kahn*, 441 F.3d 977, 986, 78 USPQ2d 1329, 1335 (Fed. Cir. 2006). Motivation may be found expressly or implicitly in the references. *Id.* at 987-88, 78 USPQ2d at 1336. “[T]he ‘motivation-suggestion-teaching’ test asks not merely what the references disclose, but whether a person of ordinary skill in the art, possessed with the understandings and knowledge reflected in the prior art, and motivated by the general problem facing the inventor, would have been led to make the combination recited in the claims.” *Id.* at 988, 78 USPQ2d at 1337. Motivation to combine references “may come explicitly from statements in the prior art, the knowledge of one of ordinary skill in the art, or, in some cases the nature of the problem to be solved.” *In re Kotzab*, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000).

Brahmbhatt discloses that conventional prior art pockets that support a BGA integrated circuit package along the peripheral bottom surface of the package have the problem that they allow possible contact with the solder ball terminals. *See* col. 1, ll. 61-65. Brahmbhatt discloses that the solution to the problem is to use an inclined surface to support the edge of the package. *See* col. 3, ll. 8-12.

The level of ordinary skill in the art is best evidenced by the references. *See In re GPAC Inc.*, 57 F.3d 1573, 1579, 35 USPQ2d 1116, 1121 (Fed. Cir. 1995) (the Board did not err in adopting the approach that the level of skill in the art was best determined by the references of record). Here, Brahmbhatt evidences that a person of ordinary skill in the art is an ordinary designer of semiconductor trays. One of ordinary skill in the semiconductor tray art, reading Brahmbhatt, would have been informed of both the problem of horizontal peripheral bottom supports and Brahmbhatt's solution of an inclined surface peripheral lower edge support.

One of ordinary skill in the semiconductor tray art would have been motivated to substitute an inclined support surface for the horizontal support surface in the pocket of prior art Figure 17 in Brahmbhatt to support the package along the edge to overcome the known problem with the prior art as taught by Brahmbhatt. The teaching-suggestion-motivation for the modification is found in the express teachings of Brahmbhatt itself.

Figure 17 of Brahmbhatt, as modified to include an inclined first wall surface, teaches claims 2 and 9-11. It would have been obvious to one skilled in the art to provide second storage portions on the opposite surface from the storage portions in Figure 17, as recited in claims 5-8, in view of the express teachings of Brahmbhatt, which has second storage portions.

(2)

**\*23** Second, consider that Figures 11, 12, 14, and 15 of Brahmbhatt teach an inclined first wall surface for supporting the edge of a component, but do not teach a second wall surface for limiting horizontal movement.

Brahmbhatt, Figures 11, 12, 14, and 15, discloses tray embodiments having inclined wall surfaces 80 (corresponding to a “first wall surface”) parallel to the side surfaces 13 of the component 12 and supporting the peripheral lower edges of the component 12. The differences between this embodiment and the claimed subject matter are that the embodiments do not disclose: (1) a “second wall surface disposed around a circumference of the semiconductor integrated circuit device so as to limit horizontal movement of the semiconductor integrated circuit device,” as recited in claims 1 and 16; (2) “said second wall surface extending upward from an upper edge of said first wall surface, wherein said second wall surface is inclined at an angle larger than the angle of said first wall surface, with respect to the horizontal,” as recited in claim 1; and (3) “said second wall surface extending from said first wall surface in a direction away from said first surface of said



main body, wherein said second wall surface is inclined at an angle larger than the angle of said first wall surface, with respect to the horizontal,” as recited in claim 16.

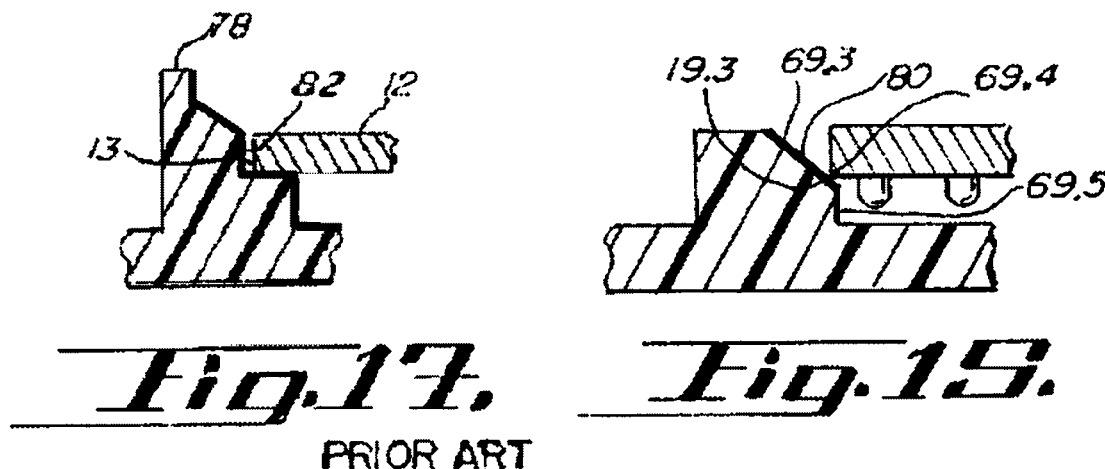
Brahmbhatt discloses that it was known that “earlier trays utilize vertical side walls of other structures with vertical engagement surfaces which constrain the lateral movement of the component in the pocket” (col. 1, l. 66, to col. 2, l. 1). Figure 17 of Brahmbhatt discloses a prior art pocket structure having a vertical surface leading to an angled guide-in surface which extends to a vertical engagement surface 82 and then to a horizontal ledge. The vertical surface 82 constrains horizontal movement of the side surface 13 of the component 12. *See* col. 6, ll. 35-38. The horizontal ledge supports the peripheral bottom surface of the component package. Brahmbhatt discloses that an advantage of using an inclined support surface with an “angled guide-in surface portion extending all the way to the seating surface” (col. 3, ll. 20-22), instead of an “inclined surface leading into a pocket with vertical sidewalls as shown in FIG. 17” (col. 6, ll. 9-10), is to form a thinner tray (col. 6, ll. 35-40):

Referring to the prior art of FIG. 17, the embodiments above significantly do not have the vertical surface 82 which confronts and constrains the side surface 13 of the component 12. This allows a thinner tray thickness facilitating higher stacking densities, less material in the molded tray, and simpler and easier molding.

And, the summary of the invention states (col. 3, ll. 20-26):

Another advantage of the invention is that the angled guide-in surface portion extending all the way to the seating surface allows a thinner tray as compared to configurations with a guide-in surface extending to vertical surfaces which confront the components side surfaces. The thinner tray allows greater stacking densities and uses less material for the tray.

\*24 Thus, the inclined guide-in surface portion 80 in Figures 11, 12, 14, and 15, was considered an improvement over the inclined guide-in surface extending to a pocket with vertical sidewalls 82 in Figure 17 due to its lower height. Figures 15 and 17 are reproduced below with the surfaces emphasized.



A reference must be evaluated for all it fairly suggests to one of ordinary skill in the art. *See In re Lemelson*, 397 F.2d 1006, 1009, 158 USPQ 275, 277 (CCPA 1968) (“The use of patents as references is not limited to what the patentees describe as their own inventions or to the problems with which they are concerned. They are part of the literature of the art, relevant for all they contain.”). All disclosures of the prior art, including unpreferred embodiments, must be considered. *See In re Lamberti*, 545 F.2d 747, 750, 192 USPQ 278, 280 (CCPA 1976).

Again, we find that Brahmbhatt evidences the level of ordinary skill in the art and evidences that a person of ordinary skill in the art is an ordinary designer of semiconductor trays. One of ordinary skill in the semiconductor tray art would

have appreciated from Figure 17 of Brahmbhatt, if not from personal experience, that it was known to use vertical engagement surfaces to constrain the lateral (horizontal) movement of the component in the pocket. One skilled in the art also would have appreciated the prior art arrangement of a guide-in surface leading to a vertical engagement wall 82 in Figure 17 could be used if the advantage of a thinner tray thickness was not needed. Accordingly, one of ordinary skill in the semiconductor tray art would have been motivated to modify the inclined “first wall surfaces” in Figures 11, 12, 14, and 15 by adding a vertical “second wall surface ... to limit horizontal movement of the semiconductor integrated circuit device,” to further restrain movement of the component and to provide the guide-in surface and vertical wall 82 of Figure 17 if the advantages of a thinner tray were not needed. The vertical surface would be located above the seating location as shown by Figure 17. The teaching-suggestion-motivation for the modification is found in the express teachings of Brahmbhatt.

It is noted that Figures 14 and 15 show the inclined surface raised above the horizontal bottom surface of the tray. As discussed in the new anticipation ground of rejection, the claimed “bottom surface” may be considered to extend up to the lower edge of the inclined surface. In addition, however, it would have been obvious to extend the inclined surface in Figures 14 and 15 down to the horizontal bottom surface in view of the ridge 69.1 in Figure 7. The teaching-suggestion-motivation is found in the express teachings of Brahmbhatt.

Brahmbhatt, as modified, teaches claims 2 and 5-11.

*Brahmbhatt and Murphy - claims 3 and 4*

\*25 Brahmbhatt discloses storage pockets which are formed by discrete component engagement means 76 (e.g., Fig. 12). The differences between Brahmbhatt and the subject matter of claims 3 and 4 are that Brahmbhatt does not disclose that the “first storage portions” are defined by pairs of intersecting ridges, as recited in claim 3, or that each ridge “defining said first storage portions has a wall surface for serving as said first wall surface,” as recited in claim 4.

Murphy is directed to a tray for semiconductor integrated circuit devices and, thus, is within the inventors' field of endeavor and within the scope of the prior art. See *In re Deminski*, 796 F.2d 436, 442, 230 USPQ 313, 315 (Fed. Cir. 1986) (the reference must either be in the field of the applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned); *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1535, 218 USPQ 871, 876 (Fed. Cir. 1983) (“The scope of the prior art has been defined as that ‘reasonably pertinent to the particular problem with which the inventor was involved’.”).

Murphy discloses a pocket storage area 420 formed by transverse beams 412, 413, 416, and 417. A pocket has four corner supports 422, each with an upstanding wall section 430 with first and second positioning fingers 431 and 432 having inner vertical surfaces 433 and 434 adapted to be proximate an edge of the integrated circuit package 401. The tops of the fingers have chamfered surfaces 437 and 438. The package 401 is supported on its bottom surface by platforms 444 on the top of pedestals 440, 441, 442, and 443, and by upstanding ribs 450 and 451. As the integrated circuit package 401 is loaded into a pocket storage area, the chamfered edges 431 and 432 of the fingers and the finger surfaces 433 and 434 align the package 401 with the pocket. See Figs. 4 and 5; col. 5, l. 1 to col. 6, l. 17.

Murphy does not expressly teach why transverse beams (intersecting ridges or ribs) are used to define the pocket storage areas. It is not required that the prior art teach why something was done to establish motivation, but only that it has been done, because patents often leave out descriptions of things that are well known. See *Paperless Accounting, Inc. v. Bay Area Rapid Transit System*, 804 F.2d 659, 664, 231 USPQ 649, 652 (Fed. Cir. 1986) (“A patent applicant need not include in the specification that which is already known to and available to the public.”). Nevertheless, we find that persons of ordinary skill in the art had sufficient skill to appreciate that the purpose of longitudinal and transverse ridges is

to provide rigidity to the tray and that rigidity was desirable for handling purposes.<sup>[FN4]</sup>

**\*26** One of ordinary skill in the art of semiconductor trays would have been motivated to modify Brahmbhatt to include longitudinal and transverse ridges to define the storage pockets because Murphy teaches that it was known to use ridges to define pocket storage areas in semiconductor trays. The teaching-suggestion-motivation is found in Murphy. One of ordinary skill in the art would also have been motivated to modify Brahmbhatt to include ridges because one of ordinary skill in the art would have appreciated that the ridges are desirable to increase the stiffness of the tray. This teaching-suggestion-motivation is found in the level of ordinary skill in the art of one analyzing the Murphy patent.

Claim 4 recites that each ridge “has a wall surface for serving as said first wall surface.” This is a broad limitation that does not specify the exact relationship between the first wall surface and the ridge. If Brahmbhatt is modified to have ridges, each ridge would have to have a wall surface to support the component. In any case, it would have been obvious to integrate any ridges with the component engagement members 76 in Brahmbhatt because these members define the boundaries of the pocket.

### CONCLUSION

The anticipation rejection of claims 1, 2, 5-11, and 16 under [35 U.S.C. § 102\(b\)](#) is *reversed*.

The obviousness rejections of claims 3 and 4 under [35 U.S.C. § 103\(a\)](#) are *reversed*.

The indefiniteness rejection of claim 16 under [35 U.S.C. § 112](#), second paragraph, is *affirmed*.

The rejection of claim 16 under [35 U.S.C. § 314\(a\)](#) for broadening of the scope of the '595 patent is *reversed*.

New grounds of rejection are entered pursuant to [37 C.F.R. § 41.77\(b\)](#). [37 C.F.R. § 41.77\(b\)](#) provides that “[a]ny decision which includes a new ground of rejection pursuant to this paragraph shall not be considered final for judicial review.”

[37 C.F.R. § 41.77\(b\)](#) also provides that the patent owner, within ONE MONTH from the date of the decision, must exercise one of the following two options with respect to the new ground of rejection to avoid termination of the appeal as to the rejected claims:

- (1) *Reopen prosecution*. The owner may file a response requesting reopening of prosecution before the examiner. Such a response must be either an amendment of the claims so rejected or new evidence relating to the claims so rejected or both.
- (2) *Request rehearing*. The owner may request that the proceeding be reheard under § 41.79 by the Board upon the same record. The request for rehearing must address any new ground of rejection and state with particularity the points believed to have been misapprehended or overlooked in entering the new ground of rejection and also state all other grounds upon which rehearing is sought.

**\*27** The time period for response may not be extended.

### AFFIRMED-IN-PART -- [37 C.F.R. § 41.77\(b\)](#)

FN1. The question of what is meant by “in a direction away from said first surface of said main body” is treated in the indefiniteness rejection of claim 16 under [§ 112](#), second paragraph.

FN2. eDAN (electronic Desktop Application Navigator) is an interface to IFW (image file wrapper), PALM (patent application locating and monitoring), and other data available in USPTO Automated Information Systems.

FN3. A traverse of a finding of Official Notice requires more than just a statement that the fact is not in a reference. A “traverse” is “[a] formal denial of a factual allegation in the opposing party's pleading,” *Black's Law Dictionary* (7th ed. 1999). That is, a traverse is similar to answering the factual allegations in a complaint in a civil action. Cf. *Fed. R. Civ. P. 8(b)* (“A party shall ... admit or deny the averments upon which the adverse party relies. If a party is without knowledge or information sufficient to form a belief as to the truth of an averment, the party shall so state and this has the effect of a denial.”). An applicant or patent owner may traverse a finding of Official Notice by simply averring that “those of ordinary skill in the art were not aware of [the fact]” or that “applicant [or patent owner] is without any knowledge or information as to whether those of ordinary skill in the art were aware of [the fact].” This avoids putting the Office to the task of proving a fact which is well known.

FN4. Patent owners may traverse this finding by an appropriate statement as discussed in footnote 3. Of course, this would only negate the finding of the reasons for transverse ridges, not the teaching of ridges in Murphy.

#### CONCURRING OPINION

Martin

Administrative Patent Judge

I concur in the majority opinion in all respects except that I would reverse the rejection for anticipation by Brahmhatt for somewhat different reasons.

I would begin by determining whether Brahmhatt's surface 68, on which the Examiner and Requester would have us read the claimed first and second wall surfaces, includes portions satisfying the requirements of Claims 1 and 16 that (a) the first wall surface be inclined at first angle with respect to the horizontal and (b) the second wall surface extend from the first wall surface and be inclined at an angle larger than the angle of the first wall surface with respect to the horizontal. I agree with the majority that the foregoing claim limitations (1) require that the first and second surfaces be in contact, (2) do not imply that either wall surface is flat or even approximately flat, and (3) require a identifiable physical transition between the two wall surfaces which need not be abrupt. I would hold that the physical transition requirement is not satisfied by dividing surface 68 into two surfaces by the slanted line shown in Requester's annotated Figure 7 (Requester's Br. 15), because that line does not correspond to an identifiable physical transition between two parts of surface 68.

**\*28** On the other hand, all of the above conditions are satisfied when the first wall surface is read onto the slightly rounded ridge 69.1 (col. 5, ll. 39-40) and the second wall surface is read onto the remainder of the surface 68, a reading addressed by the majority. Under these circumstances, an identifiable physical transition exists where the rounded ridge 69.1 meets the remainder of surface 68. Furthermore, this ridge supports an edge of an integrated circuit device, as required of the first wall surface by Claims 1 and 16. However, I agree with the majority that two limitations relating to the second wall surface are not satisfied. The first is the requirement of Claim 1 that the second wall surface “extend upward from an upper edge of said first wall surface.” Instead, the second wall surface extends sideways from the first wall surface (i.e., rounded ridge 69.1). The second limitation that is not satisfied is the requirement of Claims 1 and 16 that the second wall surface limit horizontal movement of the integrated circuit device. Surface 68 has not been shown to inherently perform this function and the assertions of inherency by the Examiner and Requester are based on reading too much into the dimensions in the drawings. See *In re Wright*, 569 F.2d 1124, 1127, 193 USPQ 332, 335 (CCPA 1977) (“Absent any written description in the specification of quantitative values, arguments based on measurement of a drawing are of little value. *In re Chitayat*, 56 CCPA 1343, 408 F.2d 475, 161 USPQ 224 (1969).”); *Breen v. Cobb*, 487 F.2d 558, 559, 179 USPQ 733, 734 (CCPA 1973) (“The skilled artisan, if he noted the amount of offset in any of the drawings at all,

would regard the showing as accidental or arbitrary.”).

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